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East Europe Report

SCIENCE AND TECHNOLOGY

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6 June 1985

EAST EUROPE REPORT

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GERMAN DEMOCRATIC REPUBLIC

FRG INSTITUTE EXAMINES GDR'S NEED FOR WESTERN TECHNOLOGY

Duesseldorf VDI NACHRICHTEN in German No 49, 7 Dec 84 p 5

[Article signed 'ft': "First-Rate Research: A Challenge Also in the GDR"]

[Text] Support for first-rate research and technologies is an essential precondition for international competitiveness not only in the Federal Republic of Germany, but also in the GDR. This joint starting position was the focus of the workshop discussion with participants from East and West, concerning which representatives from the Institute for Society and Science [Institut fuer Gesellschaft und Wissenschaft - IGW] at the University of Erlangen-Nuremberg reported in Bonn.

Despite all of the differences in the social and economic systems, such comparative research studies on the scientific systems in both the East and the West, as carried out in systems comparisons by the Institute for Society and Science (IGW) since 1963, permit recognition of common problems and possibilities for solving them.

In both countries, the demand for first-class achievements is backed up in a similar fashion with economic arguments, so that in this respect, one can speak of a problem analogy. The differences become clear in those areas where the necessary steps are adjusted to suit the respective differences in the scientific systems. Whereas the GDR, in following the Soviet model, has concentrated research at the academies and essentially assigned teaching duties to the universities, in the Federal Republic of Germany Humboldt's demand for the unity of research and instruction at the universities was preserved. Without giving up the preeminence of the academies as central research institutions, however, in the GDR intensified research efforts are now being demanded once again from the colleges and universities. At the same time, new scientific blood is being selected from the "academical" university system early on, brought together in elite groups, and given special encouragement. Here prominent sources frequently point out that the practices and methods of competitive sports should be utilized for training first-class researchers. Motivation is to be increased through the use of material and non-material incentives, such as bonuses, trips abroad, increased involvement in research planning, and State awards.

Agreement exists among science researchers that the effectiveness of these administrative measures depends essentially on the level of social and

political consciousness and the socio-cultural environment. The scientists at IGW come to the conclusion in their analyses that the situation in the GDR gives no reason to expect that the efforts aimed at increasing the personal interest of scientists as a prerequisite for first-class achievements will lead to the success desired. Because a deficit in first-class technologies will therefore continue to exist, a deficit which cannot be compensated by increased cooperation within the East Bloc, the GDR will be interested in the future in expanding scientific collaboration with the Federal Republic. The chances and problems involved with this should be taken into account in research policy.

IGW's system comparative science research helps in uncovering common problem areas for the industrial nations and in developing strategies for solving them. Thus, it is important, in light of the growing public awareness of environment dangers, to learn to understand better the causes, chain of effects, and potential solutions for the negative side-effects resulting from intensive industrialization in central Europe. The GDR and the Federal Republic of Germany in fact have higher than average expenditures for health--more than 10 percent of the gross domestic product, i.e., of national income, yet the state of public health lies clearly below the level of comparable industrial countries. Based on international comparisons, the life expectancy of the West German citizen ranks only in 18th place, the life expectancy of the citizen of the GDR is even in 28th place. In both countries, this finding obviously relates to the highly urbanized areas, which also exhibit unfavorable birth development.

The IGW's research activity is sponsored by the German Society for Contemporary Issues and since 1969 has been subsidized by the Federal Ministry for Research and Technology to a current amount of about DM 2 million annually. Under the direction of Dr Clemens Burrichter, 14 scientists work at the institute in an interdisciplinary team of scientists in the humanities, social science, technology, and natural science.

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LEGAL ASPECTS OF COMPUTER SOFTWARE EXCHANGE EXAMINED

East Berlin WIRTSCHAFTSRECHT in German No 4, 1984 pp 100-102

[Article by Prof Dr Klaus Bernstein, director, Application Center for Computer Technology, and Klaus Foerster, legal officer, Karl-Marx-Stadt VEB Robotron Accounting Machine Works: "On the Legal Questions of the Exchange of Machine-Oriented Computer Software in the GDR National Economy"]

[Text] Computer software is the totality of documented instructions for the operation of an information processing machine.

Computer software is created as one of the tasks assigned in the science and technology plan. It functions cooperatively as scientific-technical work or as a scientific-technical product, preferably in source form as written documentation and/or as a program.

Computer programs in objective form are stored on data carriers and supplied as a functional unit or control unit.

For about 3 years newly developed office computers based upon microprocessors have been on the market. These information processing devices are of primary importance in rationalizing the management and administration of the national economy. To an increasing degree they serve in the guidance and control of production processes and as microcomputer development systems in rendering scientific-technical work more efficient, especially in the development and testing of programs. In harmony with the economic strategy of the 10th Party Congress of the SED there exists therefore a great national economic demand for computer technology. The efficient employment of the latter depends very essentially upon the development and production of universally usable software which meets the needs of users within the national economy.

In consequence of parallel technical-technological developments computer software in particular has become a nonmaterial object of exchange having importance in the national economy. The readiness with which software can enter into cooperative activities and the need to fully exploit its economic capabilities place in the foreground of practical interest questions which bear upon the appropriate legal forms to be used and upon the correct content of

contracts employed in the exchange of such software. The answers to these questions are not unambiguous and in economic practice there is wide divergence of views especially with regard to the relevant contract type and such content problems as price and remuneration and the utilization rights of persons making use of contractually acquired software.

A number of complicated legal problems need clarification which have their origin apparently in the nature and in the phenomenological or presentational form of software as a completely novel product of scientific and technical progress. These problems do not permit an immediate schematic classification of software within the system of services already legally defined and legally delimited with respect to one another. The industrial lawyers in joint activity with expert technicians and economists must frame these questions and find answers to them which shall promote creativity in the production of software, consistently implement industrial accounting in the relations between originators and users and meet the national economy's need for software by effectively shaping the industrial contract.

The authors of this paper use the forms of exchange of machine-oriented software [1] to illustrate their view of selected fundamental legal questions relating to software cooperation. In the interim the Central Court of Contracts in two basic cases [2] has delivered an opinion with regard to these questions and subsequent to this opinion the authors expressly point out that they base their utterances on the fundamental position that controversy on the topics discussed has only now begun and that divergent ways of looking at these problems will usefully advance the necessary process of clarification.

The Creation of Software Within the Framework of the Science and Technology Plan as a Basis for the Formation of a "Contract" Concept

What is computer software? The answer to this question by its very nature represents the point of departure for any definition which will describe software in the exchange process as an object within the area of those services which are subject to industrial-legal regulation. The framing of this question is also necessary because software has never been regulated expressly within the domain of applicability of contract law or within the definitions of its implementation ordinances. The term "computer software" is understood to mean in accordance with internationally conventional usage the totality of documented instructions for the operation of an information processing machine (computer), consisting of a computer program, a program description and user documentation (also called concomitant material) [3]. The documentation of the computer software takes the form of verbal or written material. The actual computer program, consisting of a sequence of commands, which produces the working and functional capability of the computer and thus permits the initiation of the user's program, is stored on a machine-readable data carrier. In both forms, computer software is capable of cooperation either jointly or separately. In the exchange process computer software is classified as a nonmaterial creation. Software arises as the product of intellectual-creative work which applies scientific-technical methods of working. The creation of software takes place as a development in accordance with the nomenclature for various stages of labor and for services which has been

established by the science and technology plan [4]. Any cooperation units directed toward the creation of software is a scientific-technical service in accordance with Section 2 of the First DVO/VG.

To the extent that developed software exists within the originator's enterprise as a scientific-technical product it is a usable product in the sense of Section 18, Paragraph 2, of the First DVO/VG so that the exchange of existing software can be carried out as a remunerable utility on the basis of a contract for the distribution of scientific-technical products. The Central Court of Contracts follows this view in its basic decisions, wherein it characterizes the software documented on a data carrier as a usable product in the sense of a factory organizational and industrial organizational engineering design in accordance with Section 18, Paragraph 2, of the First DVO/VG. This establishes, in terms of the current legal situation, the contract for the distribution of scientific-technical products for remunerable use and obviously having generalized application as a legal form for the exchange of data carriers supporting documented software. The bearing of this in the special case of basic software cannot be assented to without some differentiation. To this end it is necessary to investigate further specifics of the latter computer software.

On the Exchange of Basic Software in Source Form or Object Form

For a further clarification of the group of problems with which we are presented the computer program must be subjected to a closer examination. In the process of creating software the programming takes place in source form and object form. The source program is written in an appropriate notation with corresponding comments. It is by means of this that the programming in its proper sense takes place, on the basis of the prescribed algorithm. The source program is readable to a specialist and permits either adaptation to or modification of a piece of basic software, e.g., for the solution of a user's specific problem. The program in object form is the translation of the source program into machine language. The program phase, stored on data carriers cannot be assigned a value--apart from simple programs the workability within the computer prescribed by the coding. From this it follows that existing source programs of the basic software (also true of user's software) are ordered by suppliers from originator enterprises whenever there is an intention to utilize, that is, whenever the prototype form (source) of the program is required for modifying software for one's own needs and/or for creating new software. Under these circumstances there is frequently need, in addition to written documented computer software, for further communication services in the form of consultations. In this latter case there must be a contract for the remunerable distribution of scientific-technical results. But we should like to point out that we do not consider the application of this form of contract to be limited to the case described. Rather we consider that one should make clear the limitation of the use of this contract form to the exchange of object programs.

Thus, in contrast, the user orders a basic software program in object form in order to more efficiently use a computer which he is operating or in order to make the computer usable for other problem solutions. In this case apart from

the computer software no further communications services are required. The existence of value arises through utilization in the computer and the achievement of a rationalizing or plant organizational effect. It might be objected here that legally no contract need be used other than that in the above-cited example because Section 18, Paragraph 2, of the First DVO/VG does not require any communication services as a prerequisite for the utility of a scientific-technical result (in contrast to the legal status defined by the First DVO/VG 1965) [5]. In addition, the immediate productive employment of a scientific-technical result constitutes an action of utilization [6]. We would oppose to this that nevertheless there is no exchange of a scientific-technical result. For that, of course, the programmed data carrier with its effect on and in the computer must be subjected to a technical evaluation.

Programmed Data Carriers as Functional Units and Control Units Are Industrial Products

Being nonmaterial services scientific-technical results in order to be exchangeable require an information carrier. The service within the meaning of the contract is the scientific-technical result; the information carrier is the intermediary of the service action [7]. The choice of the information carrier takes place in such a manner as to provide that the scientific-technical information is appropriately documented. For scientific-technical services no particular interest generally attaches to the nature of the information carrier or to the documentary form assumed by the result [8].

As has been said above this is in principle also applicable to software insofar as it exists in the form of a program, a program description or applications documentation, as verbal or as written work. But certainly the situation is different in the case of the computer program in the object code. In this case the computer program is stored on a data carrier such as punched tape, punched ribbon, a magnetic tape cassette or a diskette and in this form delivered to the user. The user takes over the computer software stored on the data carrier without further processing to operate the computer. In this situation the data carrier is input into the computer and it then carries out, e.g., as a magnetic tape cassette or as a diskette, immediate technical or productive functions. In such a case the data carrier is no longer merely a carrier of information but in its unity as a programmed data carrier has utility in controlling the computer which is analogous to the mechanical control, for example, of a machine tool. The program on the data carrier is, as a scientific-technical result, uninteresting to the user, just as for the purchaser of a production facility it is a matter of indifference to know in what form the control of the facility, as a scientific-technical result, presents itself to the manufacturer.

Programmed data carriers which provide the basic functions of a computer or control the operation of its input and output devices are designated as "function and control units" (FSE) and are industrial products. They are classified as belonging to the ELN [product and performance nomenclature] of the computer like other hardware structural elements. The FSE can also be called program copies, to use the international conventional term.

Delivery Contract--The Legal Form for the Exchange of FSE

The FSE are exchanged in the above-described form as industrial products on the basis of delivery contracts. This thesis is not based solely on their character as a product. It is still necessary to determine the extent to which the nature and manner of the service and the issue of the service may be subsumed under the legal form of the delivery contract. For this Section 67 VG requires that the fund ownership should be transferred to the ordering industrial unit. Nothing opposes the transfer of fund ownership of FSE in exemplar form. The fund possessor has authority to possess, use and have access to the delivery exemplar(s) of the FSE. It follows from this that he can use the delivery exemplar(s) for operating his computer(s) and may transfer these delivery exemplars to third parties.

Running the program in the computer results in storage of a copy which in turn makes possible unlimited production of program copies. The characteristic feature of computer programs that they can be multiplied without limit has put into the center of practical interest the question of authority to transfer to third parties software which has been acquired contractually. This question also arises properly when documented software constitutes a scientific-technical result [9]. By reason of the technically and economically well-founded need for protection of the development costs incurred by the software originator the Central Court of Contracts has rightly made the following declaration: "It is recognized that in the distribution of universally usable software ... a special situation has been created by the existence of a national economic need for the contractual exclusion of software distribution by partners other than the originator." The right to contractual exclusion of transfer to third parties must be recognized as an enforceable legal claim.

In consequence an analogous legal situation must be assumed in the act of supplying FSE. The right, as fund holder, to dispose of the delivered exemplar does not extend to the data carrier copies obtainable within the context of that user authorization which is conferred by the operation of a program. What is involved here is a specific case resulting from the operation of an information processing machine. It is a case in which a usable secondary result is obtained which extends beyond the actually purposed use of the FSE to control the computer. Nevertheless, in the production of program copies as a necessary preliminary to transfer to third parties storage on (new) data carriers is again necessary. From this it follows that in the manufacture of new program copies the computer program which is "split off" by the FSE in the memory of the computer as a control is actually and legally being used as a scientific-technical product. But it is to be recommended that in the delivery contract there should be an explicit agreement excluding the right to transfer to third parties the FSE which is independently producible by the individual who has ordered the FSE and/or also explicitly excluding the right to transfer any rerecording of the stored program. The ease with which program copies can be produced makes it necessary to place the prohibition of transfer under a sanction. Otherwise this agreement would be ineffectual and the position of the contract-violating partner would be de facto as though there existed no prohibition against transfer, i.e., he could at relatively little expense acquire unjustified economic gains. The claim to compensation in

accordance with Section 105, Paragraph 3 VG, does not at all improve the legal position of the originator. Therefore the Central Court of Contracts in its fundamental decisions has provided a contract penalty (with costs determined by Section 56, Paragraph 1 VG) and this penalty is set up in such a way as to exclude the possibility of demonstrating (in accordance with Section 56, Paragraph 2, Sentence 1 VG) that the circumstances leading to the infringement were unavoidable. We are of the opinion that such a contract penalty must also be recognized as an enforceable legal claim.

No one disputes that the individual ordering the software may make use, for other computers of his own in his operation, of program copies produced in his computer through the operation of the FSE. In this connection the question is often asked why under particular conditions a purchaser of several computers is charged for the same computer software for each computer. In our previous discussions--in agreement with the Central Court of Contracts in its fundamental decisions--we have considered computer software without linking it contractually to particular hardware. Internationally it is customary in this case to speak of so-called unbundled or decoupled software. But in the process of delivering computers there also exists, for technical reasons, a form of delivery called "hardware-linked" delivery of basic software (bundled delivery). Thus, for example, the A 5120/5130 office computer is delivered under contract terms as a hardware unit together with the SIOS operating system as FSE. This is necessary because any office computer can run and be tested with respect to its functioning and usability (as a complete service) only in conjunction with the operating system. As a further example of bundled delivery there may be mentioned the DEUS 100 microcomputer development system in which the operation of the A 5120/5130 office computer alone with the UDOS software package represents an instance of use as a microcomputer development system in connection with operation as an office computer.

The legal judgment of questions with regard to configuration of the software delivery contract will be treated separately in a subsequent study.

The Distribution of Basic Software as FSE Is the Most Satisfactory Method of National Economic Utilization

The basic software very essentially determines the efficiency of the use of computer technology and its utility in the most varied applications. Therefore it is in the interest of the national economy to make the software available to users quickly and in immediately usable form. The programmed data carrier is the technical approach which is most suitable to the attainment of this end. In addition, it yields the following national economic effects:

- i. The FSE can be mass produced and delivered in usable form at low distribution cost. This presupposes the adequate availability of modern data carriers.
- ii. With the mass supply of newly developed basic software for such applications as text processing, computer-oriented design and others a high level of standardization is achieved for the national economy. It follows that the same may be said for standard user software such as the text processing itself.

iii. The availability of standardized basic software will have the effect of avoiding duplicate developments in the national economy.

iv. Through the distribution of standardized basic software, as opposed to sporadic software exchange, the range of utilization is broadened and can be calculated with high precision in the interest of economical exchange.

BIBLIOGRAPHY

1. Also as machine-oriented system documentation; compare "Oekonomisches Lexikon Q-Z" [Economic Lexicon Q-Z], Berlin, 1979, p 292, or designated in the international literature as basic software. In the following text the term "basic software" is used. This includes operating systems, programming languages and service programs and help programs.
2. Decisions 22-A-1/83 and 22-A-3/83 with annotations; WR, No 1, 1984, p 21. Whenever in the following there is reference to ZVG decisions or fundamental decisions it is these which are meant.
3. From WIPO Publication No 814: "Design Specifications for the Protection of Computer Software" (Section 1).
4. Compare also ZVG decisions, loc. cit.
5. Compare Schwenk, K.-D., "Industrial Law Governing Scientific-Technical Services," WR, No 2, 1982, p 105.
6. Compare the collective of authors headed by Osterland, R., "Vertraege in Wissenschaft und Technik" [Contracts in Science and Technology], Berlin, 1980, p 29.
7. Compare Linden, W., "Scientific-Technical Products--Informationware--Ware Exchange," WISS. ZEITSCHRIFT DER MARTIN-LUTHER UNIVERSITAET HALLE-WITTENBERG, Vol 31, No 1, 1982 G, p 80.
8. Compare the collective of authors headed by Osterland, R., loc. cit.
9. On the obligation-to-offer governing contractually acquired scientific-technical products, see Section 18, Paragraph 3, of the First DVO/VG and Section 26, Paragraph 4, of the AO of 23 November 1983 regarding the use of industrial accounting in research and development (GBI. I, No 36, p 387).
10. Compare annotation to ZVG decisions, loc. cit.

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GERMAN DEMOCRATIC REPUBLIC

MEASURES TO HEIGHTEN PRACTICAL DEMANDS ON R&D DUBBED 'FICTION'

West Berlin FS ANALYSEN in German No 6, 1984 (signed to press Nov 84) pp 51-62

[Paper by Guenter Lauterbach: "Changes in Management, Planning and Control of Science and Technology at the Turn of the Year 1983-1984"; revised version of paper delivered at the 10th Symposium of the Research Institute for Inner-German Economic and Social Issues, West Berlin, on 22-23 Nov 84]

[Text] 1. Background of Problem

The weakness of the GDR industry with respect to innovation constitutes a permanent challenge to the GDR economic leadership. The persons involved in economic policy are especially worried because of the discrepancy between the relatively high R&D expenditures and the inadequate utilization of the R&D results in products and processes. At the GDR economic conference at the end of September 1983, not only Politburo member Guenter Mittag very emphatically indicated this deplorable state of affairs but also economists and leaders of industry at this event complained about the inadequate economic yield of the scientific-technical work and the unsatisfactory economic effectiveness of science and technology.¹

The GDR economic leadership had made great efforts in past years to improve the innovative strength of GDR industry. In this connection, especially the formation of combines should be recalled; it had been expected that the latter would provide, among other things, an acceleration of technical progress.

Approximately since 1982 renewed stepped-up GDR efforts are discernible to improve the economic mechanism.² A series of measures and legal regulations are directly concerned with management, planning, and control of science and technology by combines, enterprises and research facilities. What is involved here is the Order on the Application of Economic Accounting in Research and Development, the First Implementing Regulation on the Duties Record Book Decree as well as the Order on the Economic Overall Account for Research and Development Tasks and the Year-end Statement of the Science and Technology Account, all of which went into effect at the beginning of this year.³ In the following I would like to deal in more detail with these new regulations. In this connection I am primarily interested in the question whether the application of research results to new marketable products and improved production technology can be accelerated with these measures.

Replacement of existing products by more efficient ones now occurs in short intervals in the industrial states. GDR industry must also adapt itself to this trend if it wants to remain competitive. At the aforementioned economic conference, Guenter Mittag asked the GDR processing industry for annual replacement of at least 20-30 percent of the product assortment.⁴

2. New Measures of Support for R&D Work

Of the mentioned legal regulations that have been in effect since the beginning of the year and with which the conditions for accelerating technical progress are to be improved, of utmost importance would be the "Order on the Application of Economic Accounting in Research and Development." This regulation was tested in seven industrial combines before it became operative.⁵ Except for a section that regulates the allocation of scientific-technical products for use against payment, this regulation applies only to research facilities outside the Academy of Sciences, the universities and colleges, thus predominantly to R&D laboratories in industry.

According to this order, combines, enterprises and state organs since the beginning of this year must now purchase solutions to scientific-technical problems also from the R&D facilities of their own or those that are subordinated to them. The research facilities on their part are to earn profits through the sale of these services.

According to the new regulation, the research facilities bear the risk for the results to be achieved. This is also apparent in the manner in which the business transaction is handled. In contrast to past practice, prefinancing by the purchaser is no longer permissible. Rather the research facility must finance the performance to be achieved by its own funds (circulating media) and credits up to its final acceptance by the customer.

The amount of profit that a research facility earns during a specific period is determined, aside from the development of the costs, by the price of the scientific-technical performance. It is to be settled by negotiation between the customer and research facility; in this process at first a preliminary price is to be agreed upon in an amount that stimulates achievement of the best possible economic results.⁶ The final price is settled only when the R&D result is available.

Assessment and valuation of the result take place as part of the so-called final defense. If the research performance meets the contractual agreements, the price is set, which consists of the following elements: the actual research costs accrued (directly attributable wage and salary costs plus directly attributable material and other costs plus indirectly attributable costs), the agreed-upon standard profit and a possibly agreed-upon special profit which can be paid in case of so-called top performances. However if the final defense reveals that the research performances show shortcomings, thus deviate from the contractual agreements "in a negative direction," the standard profit is reduced by at least 25 percent; there is no payment of a special profit. If the agreed-upon research performance could not be achieved, "neither the standard profit nor the agreed-upon special profit is to be granted."⁷ In this case, the customer is not even obliged to pay for the research costs that have arisen.

If a research facility earns a profit, it is used for the establishment of a bonus fund, financing of contributions for voluntary insurances and for the establishment of a risk fund. This sequence of dividing the profit is mandatory. The risk fund is established in an amount of one percent of the planned annual research costs; its purpose is to finance additional R&D activities, but can also be used to equalize profit reductions resulting from shortcomings in fulfilling contracts. The risk fund is supposed to enable and encourage research facilities to seek new scientific-technical solutions on their own responsibility, without a contract from a third party. The means in the risk fund moreover are also to be used to develop new fields of application of known research results.

If a research facility does earn a profit but the latter is insufficient for the establishment of the three funds, the combine or the superordinate organ is obliged to provide help for a limited time.

It is noteworthy that the research facilities, in contrast to the enterprises or combines, do not have to make any net profit payment to the state. However, indirectly they can be called upon to do so since unused net profit must be paid to the combine or to the superordinate organ and there this net profit is subject to the legal regulations on the use of the profit.

The "Order on the Use of Economic Accounting in Research and Development" distinguishes between three types of profit. The already mentioned net profit, the net profit in excess of plan, and the special profit. The use of the profit is also of special interest in the case of the above plan and special profit. The above-plan profit must be divided in the following sequence: additional payments to the bonus fund, payments to the account of young socialists, and payments to the performance fund. The special profit, by which top R&D performances are rewarded, must be separately reported. Thirty percent of it is used for additional payments to the bonus fund and 70 percent for payments to the performance fund, to the extent to which the above plan earned net profit suffices for this purpose and the upper limits for payments to the funds have not been exceeded.⁸

The financial performance incentive of those employed in the R&D departments thus by and large corresponds to that in production. Payment of the various bonuses (the research facilities pay bonuses tied to specific orders, a year-end bonus and bonuses tied to fulfillment of objectives) as in production are tied to the fulfillment of various performance criteria. The total amount of bonuses to be paid out is limited.

For operative planning and control of scientific-technical performances--e.g., for product planning--duty record books are indispensable instrumental aids of the combine and enterprise managements. According to the 1981 duty record book decree and the first implementing regulation in effect since January 1984, as a matter of principle duty record books must be prepared for all R&D tasks--exempt from this rule are only basic and applied research which do not directly lead to the development of products and processes and work without any significant R&D share with a duration of development of up to a total of 3 months.⁹

For accelerated application of R&D results in new products and processes and thus for raising the economic effectiveness of science and technology, the implementing regulation includes a series of important conditions. Thus since this year the enterprises and combines must prepare in principle for each duties record book task a so-called economic overall account that provides information on the probable extent of the benefit following application of the R&D results.¹⁰ In opening the defense of the duties record book, which takes place before a "technically competent body," the decision on the economic purposes is supposed to be in the center of consideration, not the scientific-technical ones. The primacy of the economy as against science and technology is thus clearly underscored. Important for an accelerated application of the R&D results in new products and processes, in my opinion, is also the fact that the institution of the provisional defense has now been created, which makes possible a running control of the success of the scientific-technical work. Continuation of the project is decided within the framework of the provisional defense. If it is kept in mind that only about 10-15 percent of all started projects are also economically successful--as U.S. studies have shown--then the task of the combine and enterprise management consists in concentrating on promising projects. Also included herein is the early abandoning of projects whose economic success is problematic. Such problem cases can be detected in provisional defenses. Finally it is also of importance for the accelerated application that, following a successful final defense, the general directors must make "the required decisions for the immediate introduction of the confirmed economic results of the scientific-technical work and for the production in numbers meeting demand as well as for an effective export."¹¹

Moreover, the GDR economic leadership also hopes that, by the control instrument of the "Year-end Statement of the Science and Technology Account," strong pressure is exercised on quick application of the R&D results in products and processes. Year-end Statements of Account are prepared by the combine managements, not by the research facilities. These accounting reports must show the achieved economic effectiveness and quality progress in relation to the financial means spent for science and technology; furthermore, the economic yield of the concluded R&D tasks of the report year must be assessed and production and export effectiveness of the concluded and passed-on scientific-technical results must be proved.¹² The year-end statement of account thus is cost-benefit accounting which provides a survey on the efficiency of the applied R&D funds to the combine managements and the state control organs.

3. Valuation of the Measures of Support

The package of measures approved by the GDR at the end of 1983 to raise the economic effectiveness of science and technology and to reduce the discrepancy between research expenditures and yield largely formalizes the scientific-technical work in the research facilities of industry. Operating "without rules"--as I would like to call it--in industrial research is now possible only to a very limited extent; the organizational constraints in R&D work have further increased.

A few years ago the GDR set itself the goal to reduce the time required for development of technical innovations. In general, 2 years is regarded as standard--counting from the confirmation of the duties record book up to the final defense

of the project.¹³ The regulations that went into effect in 1984 in my opinion will effectively support the rapid implementation of projects once approved, for which there is a duties record book and which are no longer changed in the processing phase. For example, if a decision has been made on a new product development, strict management is clearly justified to push the project through quickly.

Problems can and presumably will arise if new decisions must be made. The bureaucratic effort corresponding to the new regulations in all probability will lead not only to a time delay in the handling of the project, it can also have a negative effect on the motivation of the enterprise managements to tackle technical innovations. The suspicion that, with the new regulations, a bureaucracy hampering innovation is to be developed is not unjustified if one considers that aside from members of the enterprise staff and of the research facility also a whole series of persons not belonging to the combine will be included in the decisionmaking process (members of the commercial bank and superordinate state agencies).

Now short development periods alone are not sufficient to accelerate the application of R&D results in products; it is just as significant that the tasks following the development are mastered and the production times of these phases are tightened. Included here are adequate market preparation, speedy application of the scientific problem solution in production, rapid increase of production, and, following introduction in the market, product and market support, technical services and prompt response to wishes of customers. As is sufficiently known from the technical literature, these tasks still cause great difficulties to many GDR combines. In the implementing regulation to the duties record book decree, it is stated--as already mentioned--that, following successful final defense, the general directors must make the required decisions for prompt introduction of the scientific-technical results but in many cases capabilities are required for the implementation of these decisions which many GDR combines and enterprises do not possess and which they also cannot obtain on short notice. As a result, time delays occur repeatedly which considerably reduce the economic profitability of the R&D performance. "No innovation in the actual sense of the word can unfold because no resources are available and the resources are short because the rate of innovation is inadequate."¹⁴ But whoever introduces his product later frequently finds not only a considerably reduced market, he must now also expect a relatively speedy collapse of the price and smaller profit margins. He suffers "irreversible economic losses."¹⁵ The measures that went into effect at the beginning of the year completely inadequately take this component of the factor time into account, which is just as important as the reduction of the development period itself.

The measures package is unlikely to solve another problem whose mastery has a decisive effect on the economic yield of science and technology. I am referring to the frequent lack of willingness to tackle risky development tasks.

On account of the trend toward shortening the product life cycles it is important that the products constitute top performance or represent "world level" at the time when they are introduced in the market. As can easily be understood, the economic yield is then greatest. The difficulty and the trick for the enterprise

managements consists in correctly assessing coming developments early to concentrate funds and efforts on the new tasks in time. Practice demonstrates, GDR economists emphasize, "that much can be gained by a relatively small lead on the world market, but that deficiencies in receipts can also be disproportionately high in case of a relatively small lag."¹⁶

In my opinion, the common interest of research facility and production enterprise in high economic results from science and technology presumed in the "Order on the Application of Economic Accounting in Research and Development" will prove to be a fiction. Under the existing regulative policy conditions, the production enterprises as well as also the research facilities from their own interest will tackle as few risky R&D tasks as possible but will favor development projects that have high prospects of success for them. And these are, after all, in the first place further developments or redevelopments of products that have already been introduced in the market. The differentiated bonus system of the order referred to will hardly cause any changes in the attitude of those employed in R&D if the upper limits for the payment of bonuses set by the state have been nearly reached. In this case the incentive to make use of the risk fund for risky R&D projects will also be small.

The problem that combines too rarely tackle risky R&D tasks is being intensively discussed in economics. To cause a change of attitude here on the part of the combines, proposals include the installation of "a well functioning system of early recognition of qualitative changes in technology and new user needs."¹⁷ Moreover, GDR economists advocate that R&D projects be "approached" "from different sides," "the degree of assurance of the solution of the individual variants be regularly assessed so as to be able to reduce their number in time and to accelerate the most promising work."¹⁸ The economists say that only in this manner will it be possible to attain a greater R&D ability to react and adapt. This postulated plurality in the R&D work of the combines, which is supposed to lead to top performances, has no parallel in the measures package of this January.

These regulations rather emphasize the clearly defined tasks with reference to application. The main accent lies on reducing the actual development times and on minimizing development costs. This is a necessary condition for the accelerated application of the R&D results to new marketable products and new production technology but fails to do justice to the complex problem which the increase of the economic yield of scientific-technical research constitutes. The phases and processes preceding and following the actual development time, which are also to be included in the development time, are only insufficiently affected by the adopted measures. That is problematical because, with the trend toward shorter production life cycles, the development times are more critical than development costs. High development costs can relatively easily be earned by the economic advantages offered by an innovation monopoly.¹⁹

In general it can be stated that the measures put into effect at the beginning of the year lag behind the level of discussion in economics. This is noteworthy, among other things, because of the fact that the so-called lead function of the economists in the past very frequently was not fulfilled. It remains to be seen how "politics" and "administration" are going to react to the proposals from the sciences.

FOOTNOTES

1. Guenter Mittag, "Theoretical Generalization of the Experiences in the Development of the Combines for the Increase of the Performance in the Economy, Especially in the Utilization of the Qualitative Factors of Growth," in: WIRTSCHAFTSWISSENSCHAFT, 1/1984, pp 39-40 and No. 2/1984 of the same periodical in which discussion speeches of this event are reprinted.
2. Doris Cornelsen/Manfred Melzer/Angela Scherzinger, "GDR Economic System: Reform by Small Steps," in: VIERTELJAHRESHEFTE ZUR WIRTSCHAFTSFORSCHUNG, No. 2, Berlin 1984, pp 201 and 221 ff, and Karl C. Thalheim et al., "Present Beginnings of Reform in the GDR Economic System--Renaissance of the 'New Economic System'?", in: FS-ANALYSEN, 1/1984.
3. GESETZBLATT DER DDR, Part I, No. 36/1983, p 381 ff.
4. Guenter Mittag (Footnote 1), p 41
5. Ibid., p 39.
6. GESETZBLATT (Footnote 3), p 391.
7. Ibid., p 393.
8. Ibid., p 393.
9. Ibid., p 381.
10. Ibid.
11. Ibid., p 383.
12. Ibid., p 399 f.
13. GESETZBLATT DER DDR, Part I, No. 3/1982, p 88.
14. Heinz-Dieter Haustein, "Time Factor and Effectiveness in the Production Preparation Phase," in: WIRTSCHAFTSWISSENSCHAFT, 2/1984, p 206.
15. Heinz-Dieter Haustein, "On the Strategy of Flexible Automation. The Computer-based Development and its Effect on Productivity," in: WIRTSCHAFTSWISSENSCHAFT, 7/1983, p 1002.
16. Claudia Grafe/Dieter Liebing/Harry Nick, Heinz Willems, "Concerning the Management of Scientific-technical Progress in the Combines," in: EINHEIT, 5/1984, p 412.

17. Ibid., p 414.

18. Ibid.

19. Heinz-Dieter Haustein (Footnote 15), p 1002.

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GERMAN DEMOCRATIC REPUBLIC

INSTITUTE DIRECTOR DESCRIBES EAST GERMAN BIOTECHNOLOGY RESEARCH

East Berlin WOCHENPOST in German No 3, 18 Jan 85 pp 16-17

[Hildegard Hesse interview with Prof Dr Manfred Ringpfeil, Director, GDR Academy of Sciences Institute for Manufacturing Chemistry]

[Text] [Question] About 10 years ago, a new concept came up: biotechnology. It developed rapidly and is called the science of the future. Are these expectations justified?

[Answer] It does, without doubt, have a most promising future, both as a science and in its practical applications. I share the view of some serious publications that biotechnology is one of the leaders in the primary development areas which will contribute to higher productivity. The OECD [Organization for Economic Cooperation and Development], for instance, lists in a prognosis as main tasks: microelectronics, utilization of ocean resources, creation of new energy sources, and biotechnology. Increasingly, this assessment--and this is also true for the socialist countries--is being confirmed by experience.

[Question] But there are also other views.

[Answer] Of course, there is doubt and skepticism here and there; this is always the case with new ideas. Looking for their origin, one discovers in most instances the solid interests of presently flourishing enterprises behind it, e.g., the American soybean monopoly against the microbiological protein synthesis. Arguments are often mixed in with factually unanswered questions so that verbal counterarguments are rarely convincing. It is, therefore, absolutely necessary to put scientific results into practice as quickly as possible. In biotechnology, pilot plants, experimental production and new products are of vital importance.

[Question] What determines the top priority in biotechnology?

[Answer] First, the rapid growth of knowledge in the biological sciences, primarily in molecular biology, microbiology, and biochemistry. In past decades, the biological sciences have gone as far down as to the molecular level of living processes and have clarified scientific principles, especially in cell metabolism chemistry, protein synthesis, heredity, and the knowledge of the structure of cell organisms. At the same time, based on this knowledge,

efforts now are increasing to understand and to influence complex processes. This forms the basis for the possibility of technical control of living processes. Based on scientifically established possibilities, it seems reasonable to create new technical solutions for the production of raw materials, energy, food, medicines, and for shaping the environment.

[Question] How can biotechnology affect our raw material situation?

[Answer] We would like to increase the supply of raw materials for our material processing industries. For this reason, we are looking for better ways to utilize fossile raw materials, to exploit reclaimed materials, such as cellulose, and to utilize again secondary raw materials with the help of microorganisms and enzymes. In this connection, we often obtain several positive effects. By utilizing the substances of waste water in this manner, we combine environmental protection and material production. Also, inorganic materials, e.g., heavy metals, can be reclaimed from diluted solutions, or very poor ores can be reprocessed. Another area is the intensification of agricultural production, and it is even possible to supplement it. Today, we are able to produce microbiological protein industrially, which is a first step towards non-agricultural food production. Feed for our animals can now be produced under large-scale industrial conditions, independent of soil quality, weather, climate, and season.

[Question] What other applications are there for biotechnology?

[Answer] Biotechnological processes are being applied in several industrial sectors: in the chemical and pharmaceutical industry, in the food industry, in metallurgy, in agriculture and in water conservation. The USSR, which established as far back as 1965 a government department for the microbiological industry, produces since 1980 more than 1,000,000 tons of feed yeast annually. In Japan, the bio-industry constitutes several percent of the national income result. Nevertheless, world-wide, only a small portion of laboratory results so far are being used technically.

[Question] Why is that?

[Answer] There are several reasons for this that affect individual countries in different ways, among them economic reasons. It is generally true that the present technical environment continues to be inadequate to meet the requirements of these new processes. For example, equipments that were developed for completely different purposes must be adapted to these biotechnical processes. We are also suffering from the lack of measuring equipment to control process parameters. In practice, these gaps are being filled only slowly. This is also true for the necessary technological knowledge. However, we do not just stand by passively, but we are designing new equipment and measuring devices. And this not only for new processes. Because several of these biotechnical processes have a 100-year-old tradition. They continue to be of economic importance today, such as in the food industry. To mention only a few: the production of alcholic beverages, milk and meat products and of baking yeast. These processes have to be researched further scientifically and must then be intensified and put into effect.

[Question] Where does the GDR do its biotechnological research?

[Answer] The GDR has several workable potentials for biotechnology. For example, our academy has started to plan for basic research at a very early date, namely, in the late 1960s--at a time when the concept of biotechnology, as we know it today, was as yet nonexistent. It is no exaggeration to state that our early entry made it possible for us to influence the direction in which this branch of science developed.

Today, quite a number of scientific, educational and industrial organizations in our republic are working on biotechnological problems. It should not be considered presumptuous of me to rank first our Institute for Technical Chemistry, whose over 400 workers have, since 1969 been working exclusively on biotechnology. In addition, there are our Academy's Central Institute for Molecular Biology and Experimental Therapy, the Technical Institute of Koethen, which is already training biotechnologists, and such combines as PCK Schwedt and CK Bitterfeld. I consider it also quite important that our Chemical Plant Combine is engaged in the development of biotechnology. This makes us one of the few countries in the world which do not only conduct solid biotechnological research, but which also have at their disposal experienced and cooperative plant construction facilities.

[Question] How about cooperation with industry?

[Answer] Successful cooperation with industry requires that the combines include biotechnological projects in their long-term development plans and that they themselves are willing to undertake a share of basic research. On the other hand, we must respond in our basic research to the needs and requirements of industry. There are encouraging examples, such as cooperation with the Chemical Plant Construction Combine, the Petrochemical Combine Schwedt, the Chemical Combine Bitterfeld, and agricultural enterprises.

It is essential that we focus not only on results which are useful in the short term. We must have the courage and supply the resources to undertake long-term tasks, that is, we need long lead times.

[Question] Has it been possible to meet these requirements?

[Answer] An example from the recent past: the Chemical Combine Bitterfeld tackled its biotechnological work objectives with a speed and farsightedness which I consider exemplary. In a short time, a reliable partnership between preliminary research and technology transfer came into being which will soon produce concrete, practical results and which, at the same time, will permit long-term development.

[Question] Do we compare favorably on an international level?

[Answer] In some areas, such as microbiological protein synthesis from fossils and reclaimed raw materials, the production of feedstuffs and energy from waste, and the reclaiming of metals from diluted solutions, we do not feel

that we lag behind others. We can carry our weight, we are respected as partners. In other areas, we are trying to establish connections. The pace is determined by how fast we will be able to combine scientific results, especially in microbiology, with technical knowledge.

[Question] What does the institute you are heading specialize in?

[Answer] Our institute is especially interested in biotechnological processes which lend themselves to mass production. If biotechnology is to be developed into a key technology, it must be operated in several sectors of the economy, and must make a significant contribution to our national income. This, in our view, can only be accomplished if we produce both, mass-produced and special goods, economically on a biotechnological basis. This is the reason why we are particularly interested in promoting the industrial microbiological protein synthesis from fossil raw materials, the technical utilization of recycled materials in agriculture, and the production of raw materials that can be recycled and of secondary products, including inorganic materials. All these processes are based on the massive multiplication of microbiological cells. We have gained theoretical and practical experience for decades and are trying to use it as much as possible. At the same time, we are pursuing new directions and we are trying to generalize our experience and knowledge so that we can use one method to produce as many special products as possible.

[Question] Is the reclaiming of raw materials a world-wide trend?

[Answer] These questions are of great interest, to both the industrial and developing countries. The former would like to meet the greater environmental requirements by combining it with raw material production on an economic basis, the latter would like to find a basis for meeting their basic need for industrial chemicals and energy. Solutions for these problems were the main topics of discussion at the most recent international symposium of the IUPAC in February 1984 in Delhi.

[Question] What are other countries specializing in?

[Answer] The USSR conducts research on a broad basis and transfers its results quickly as publications and comments by Soviet scientists have demonstrated. I am most impressed by how the microbiological protein synthesis is carried out in large industrial complexes to an extent that we find hard to imagine.

The United States is now pushing very hard for the commercialization of the "new" biotechnology, which is known as genetic engineering, cell fusion, and bioelectronics. Japan, the Federal Republic of Germany, Great Britain, Switzerland and France are both imitators of, and competitors in, this development.

These new directions will surely pay off. For that reason, they cannot be disregarded. We, too, have been working in specific areas intensively and with great determination for a decade. Our institute focuses, among others, on new microbiological reactions that can be done with methanol. Methanol can be produced through synthesis gas from soft coal and constitutes one of the future base chemicals of our republic. On the other hand, the biochemistry of methanol is just being developed--only two years ago, nobody could imagine the many different ways of synthesis, for which, with the help of micro-organisms, methanol forms the basis.

[Question] Is this the future?

[Answer] It is part of the future, just as many other things are. Think of biology whatever you wish: its entry into technology is imminent. As yet, not all directions can be recognized, and not all recognized directions can be evaluated. Success in this area is only possible if one does not wait until others have shown the safe way. New solutions must be found on the basis of economic considerations and the willingness to take risks. Obstacles will come up, and they must be eliminated. This is our method, we use it in our protein synthesis and in the reclamation of raw materials, and the success can be seen. In other areas, success is not yet visible. The generous and goal-oriented support, bioscience and biotechnology have received from our party and from our government, makes it easy to work on our task. However, we also do feel the obligation, we researchers have, to help create with our work maximum benefits for our economy.

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GERMAN DEMOCRATIC REPUBLIC

MINISTER FOR ELECTRICAL ENGINEERING, ELECTRONICS INTERVIEWED

East Berlin DER MORGEN in German 22 Feb 85 p 5

[Editorial staff interview with Felix Meier, minister for electrical engineering and electronics: date and place not given: "Microchips for Higher Quality"]

[Text] With a growth rate of 107.7 percent in industrial goods production and 110.9 percent in net production, electrical engineering/electronics is the industrial sector having the greatest planned growth for 1985 in our economy. In the following interview--which belongs to a series of commentaries by ministers to be published this year by DER MORGEN--the Minister for Electrical Engineering and Electronics, Felix Meier, describes the significance which hereby accrues to the broad application of microelectronics:

[Question] Why does the production and application of microelectronics play a key role in terms of enrichment in the economy?

[Answer] This key role is a result of the fact that microelectronics unites our economic interest in economizing to the highest degree possible on material and energy with the required greater advances in automating production and in developing a more effective production and export assortment. Microelectronics brings about enrichment by means of substantially more effective utilization of both the available material resources as well as social labor capacity. Thus, in the case of teletype machines, a few microelectronic components replaced 900 mechanical parts. The expenditure of processing energy in large chemical plants can be reduced by about 30 percent through the use of microelectronic measuring, computing, and control equipment. Just the computer-assisted preparation of production data alone for multiple-spindle drill heads resulted in a savings of 14,000 hours of production capacity at the VEB Machine Tool Factory Zella-Mehlis. Over 25 percent of the entire reduction in work time at the ministerial level, or the work capacity of 11,000 employees, was made possible through the use of microelectronics.

[Question] Which foundations were laid for this in our republic during the past several years?

[Answer] Proceeding on the basis of the strategic decisions made by the SED Central Committee and the Council of Ministers in the years 1976 and

1979 regarding the production and application of microelectronics in our republic, scientific-technical potential was concentrated on this crucial economic assignment and development of an industry for microelectronics was continued more intensively. Parallel to this, contributions toward the development of microelectronics were made by chemistry, metallurgy, the machine-building industry, and the glass and ceramics industry through the provision of specialized materials and installations.

[Question] What share in this successful development does cooperation within CEMA have, particularly with the Soviet Union?

[Answer] Development in the field of microelectronics was only possible because there existed close cooperation from the very start with our socialist brother countries, particularly with the Soviet Union. We receive part of the components utilized in the republic on the basis of governmental agreements with the USSR and general agreements within CEMA.

With the long-term program for developing cooperation between the GDR and the USSR up to the year 2000, the following areas of concentration have been established: development of modern basic technologies, new components and microprocessors, as well as the manufacture of special installations and materials for microelectronics.

[Question] As the chief producer of microelectronics, how does your ministry act in conjunction with other sectors in this area?

[Answer] Both the development and manufacture as well as the broad utilization of microelectronics require collaboration on the part of many sectors, particularly activities on the part of the users themselves. In more and more enterprise groups, corresponding centers or intermediate rationalization structures are manufacturing microelectronics or supplementing the standard solutions available and adapting them to suit in-house requirements. This results, on the one hand, in extraordinarily differentiated demands upon the respective supplementary deliveries required from our sector. On the other hand, in the production as well as application of sector-specific solutions, knowledge is gained and experience is acquired, all of which must be taken into account by us in the continued general development of microelectronics.

[Question] Why does the accelerated renewal of production and the further advance of intensification require consistent utilization of microelectronics in the economy?

[Answer] With the rapid renewal of production--the national economic plan establishes two goals for our sector in 1985: first, to guarantee by means of product turnover a consistent assortment of high-value products in demand domestically and on external markets. At the same time, we must ensure that the expenditure of material and time for its manufacture is as low as possible. Both tasks require comprehensive utilization of microelectronics. International competitiveness--in machine-tool products as well as industrial consumer goods--likewise requires outfitting with microelectronics.

[Question] Are the high growth rates in labor productivity and net production in enterprise groups involved in electrical engineering and electronics a result of the purposeful application of microelectronics?

[Answer] Double-digit growth rates in labor productivity and net production were able to be achieved in 1984 in the electrical engineering and electronics industry through the diligence and personal involvement of about 480,000 employees. About three-fourths of the rationalizing measures used in the sector originate from in-house development and fabrication on the part of plants and enterprise groups. In so doing, microelectronic solutions are utilized to a great extent.

[Question] To what extent is microelectronics also the basis for enrichment in the field of consumer goods production?

[Answer] Microelectronics not only increases the efficiency of machines and installations, its utilization also results in substantially higher, and sometimes entirely new, utility characteristics in the case of products made for the needs of the population. At the same time, the material-output relationship becomes more favorable and consumption of energy becomes less.

In the electrical engineering and electronics industrial sector, consumer goods currently account for about 18.2 percent of industrial goods production. This reflects, in particular, the increased use of microelectronics in the products of radio and television technology. Highly integrated circuits improve utility characteristics considerably. A similar situation applies to household sewing machines, washing machines, refrigerators, and cameras. The most recent examples also include the new color television sets, modern home entertainment equipment, and more advanced pocket calculators and quartz watches.

[Question] What do you see as the most important fields of application for microelectronics in the economy?

[Answer] It was emphasized at the 9th session of the SED Central Committee that microelectronics represented a decisive link particularly for the further enrichment and the growth of labor productivity. Accordingly, the 1985 national economic plan sets forth assignments for its accelerated development, production, and application. All sectors must contribute toward further increasing microelectronic production, raising its technical level, and expanding the assortment of items. The products of microelectronics should be applied everywhere at an even greater pace, for the consistent rationalization and automation of entire productive sectors as well as for computer-assisted preparation and control of manufacturing. In the development of improved products for domestic use and for export--including high-value consumer goods--the proportion of products influenced by microelectronics is an important criterion of the level attained.

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GERMAN DEMOCRATIC REPUBLIC

PROCESS AUTOMATION, IR 700 CONTROLLER AT LEIPZIG FAIR

East Berlin ELEKTRIE in German Vol 39 No 2, 1985 pp 70-71

[Unsigned notes: "1985 Leipzig Spring Fair: Products of the GDR Electronics Industry"]

[Excerpt] The automated systems industry of the GDR will be represented at the 1985 Leipzig Spring Fair with a much wider range of products: at the beginning of this year, the automated systems industry and the electrical energy systems combines were consolidated into a new, powerful industrial combine. With newly developed and more advanced systems and products, the new VEB Automated Systems Industry Combine in Leipzig will introduce itself to the international experts.

Process Automation

In the form of process automation for rolling mills, the combine's parent company, the Electro Project and Systems Construction VEB in Berlin, is going to show a new version of the modern modular automation installation system "Audatec", the design of which is based on the microelectronic and microcomputer technologies of the Ursalog 4000, Ursalog 5010 and Ursatron 5000 systems. It makes it possible to carry out functions, which existing technologies have been unable to perform in an economical way. Continued utilization of Audatec and Thyresch products for both the production and service and maintenance areas leads to significantly higher labor productivity and better quality. The advantages of using this system are reliable process application, less design, production and assembly efforts through the application of standardized, modular technologies, lower domestic energy use, and greater utilization of primary energy through optimal process application.

The concept of power station automation, employed by the VEB Equipment and Control Works Teltow in its audatec system, is based on the need to produce energy in a more efficient way and it takes account of the following factors:

- The nominal output of power stations built in recent years has been increased steadily.
- Existing groups of less efficient power stations are used to cover peak loads as part of an integrated system.
- Also, increasing efforts are being made to achieve a more efficient operation of smaller units.

The one-channel microcomputer-control system Ursamar 5001 is used as the regulating system, and the digital modular building block system Ursalog 4000 and the programmable storage control Ursalog 5010 are used for control purposes.

The Power Plant Construction VEB Cottbus has further developed the well-known excavator program control BPS 720 on the basis of its decades of experience with electrotechnical equipment of large strip-mining equipment in the GDR, and, with its BPS 5000, now offers a new microcomputer-based solution for the automation of hauling equipment in strip mines. This autonomous, microprocessor-controlled automation equipment will be used for the first time on a torary bucket excavator, by combining a K 1520 microcomputer with building block modules of the Ursatron 5000 system.

The new excavator program control has already proven itself in the large strip mines Meuro of the Senftenberg lignite combine. It is currently being tested in a bucket-wheel excavator Srs 1500. In actual operational tests, the user registered annual savings of between M 800,000 to M 1.3 million. This equals a production gain of 600,000 cubic meters of excavated material a year. With its functional units for automatic track-level cutting and side-slope profiling, the BPS 5000 represents a progressive international level.

The VEB Equipment and Control Works at Teltow offers a building-block type equipment system to collect and process volume and flow measurement values that can be used to automate the preparation, processing and dispensing of liquid products passing through pipelines.

Oval gear meters, combined with functional system units, permit the design of reliable measuring, control and regulating systems.

Furthermore, turbine flow meters, in combination with additional equipment, cannot only be used to indicate volumes, but also for the remote transmission of volumes and flows, and for determining heat volume and heat output.

The electrical volume-control system ME 02 is an advanced electrical accessory to dose liquids, consisting of a preselector and power supply equipment, with a high ratio of reliability and optimal capacity for mass production.

In order to obtain data on process automation, a system of robust, reliable, and service-friendly electrical pressure transducers has been developed, using silicon semiconductor transmitters and absolute pressure converters, all based on the piezo-resistive principle.

More highly developed pressure and differential pressure transmitters manufactured by the VEB GRW Teltow have been designed for a nominal pressure of up to 40 MPa and may be overloaded in one direction up to this nominal pressure. The measurement scale ranges from 0 - 100 kPa to 0 - 25 MPa. The output signal is either 0 - 20 mA or 4 - 20 mA.

For data collection in the industrial measurement technology of metrology and research and development, an electrical absolute pressure transmitter with a mass of only 45 g is being offered (high measuring accuracy and temperature stability: applicability also in aggressive media; robust construction and service-free operation).

Machine Automation

The newly developed system 700, exhibited by the VEB Numerik "Karl Marx" at the 1985 Leipzig Spring Fair, includes industrial robot controls, machine control systems, and microprocessor control systems.

The industrial robot control IRS 700 is a type of control that can be used for all process-flexible robots with from two to six axes, characterized by the coordinated, simultaneous movement of several axes.

The industrial-robot-specific drive construction makes the space-saving construction of the control cabinet possible, and an especially convenient control panel with a laminated keyboard permits the programming and operation with a minimum of errors from a technologically most suitable location.

Furthermore, programs can be put in via the PRG 700 programming unit or office computers, using the various programming languages and cartesian coordinates. This equipment is designed in a way that allows for the connection of optional punched paper tape readers or tape punches.

To simplify continuous path control programming, form element definitions such as a straight line, circle, helix and cone section are available.

Modular software permits IRS adaptation, without difficulty, to other robots with DC drives. Examples are IR 10, IR 60, ZM 10, ZIM 60, ZIS 995, IR 2, IR 2P and UNIZIM 30.

Up to 16 robots can be connected, in a complex system, with the programming unit PRG 700 for use as a data processing device.

Control system CNC 700 is suitable for complex machine tools for the main uses such as drilling, shaping, turning and grinding.

The CNC 700 control system contains the technical control prerequisites for the unattended operation of machines during two work shifts.

Compared with System 600, the most important new changes are:

- Parallel operation of two NC systems,
- Integration of feed robots into the CNC,
- Graphic display,
- Positioning velocity of 60 m/s, adaptable for up to 16 axes,
- Flexible design of hardware and software,
- Laminated flat keyboard for the operating unit.

As its top product, the VEB Numerik "Karl Marx" presents the MRS 700, a freely programmable microprocessor controller for continuous and discontinuous processes.

By providing a diversity of five variants (MRSW 701-705), this microprocessor control is universally applicable in all sectors of industry. The spectrum ranges from the "one-card" control to the fully expanded PC control with a multitude of input and output modules.

Examples of its application are:

- . Textile and clothing industry machinery,
 - Sewing robots,
 - Chemical cleaning robots,
 - Cross-fold machinery,
 - Double-table looms,
 - Warp-knitting machines.
- . Machines for food preparation,
 - Cacao and chocolate machinery,
 - Packaging machinery.
- . Processing Machinery,
 - Die-casting machines,
 - Injection molding machinery.

The programming technology provides for rapid adaptation to a process by means of a video screen unit PRG 700, a portable operator keyboard BT 700 or an operator and indicator unit to indicate the change the processing parameters during the operation.

In a completely expanded system, there are up to 900 input and output channels as well as four INT and four accumulator lines for direct process access. All inputs can be connected to have interrupt capability. The control has a connection for keyboard programming and a connection for attachments to superior control systems.

GERMAN DEMOCRATIC REPUBLIC

INDUSTRIAL FACILITY CONSTRUCTION COMBINE

Bonn IWE WIRTSCHAFTSDIENST in German Vol 25 No 29, 27 Jul 84 p 4

[Text] As of 5 years ago--with an institute's founding of the Berlin Central Engineering Enterprise for Metallurgy (ZIM)--by now over 750 robots have been manufactured by this enterprise. At that time the first robot went to the Maxhuetten Unterwelenborn outfit. Since then the range of products has expanded steadily, starting with four basic types of process-flexible articulated robots. A universal robot developed at the East Berlin experimental shop can be manufactured in over 70 versions. ZIM, under the name Berlin Automation Enterprise VEB, will concentrate in the future on the equipping of complete industrial facilities, as the parent enterprise of a combine which was just formed at the beginning of July. This combine, the "Central Industrial Facility Construction for Metallurgy," is geared to technological innovations and improvements. The intention was for users of ZIM technology to be no longer just the characteristic enterprises in ore mining, metallurgy, and potash mining. In machinery building, the construction trade, posts and telecommunications, or in the porcelain industry as well, means of automation offered by the new combine are to undertake to increase labor productivity.

12114
CSO: 2302/78

GERMAN DEMOCRATIC REPUBLIC

NEW REFRACTORY CONCRETE DESCRIBED

East Berlin NEUE ZEIT in German 22 Jan 85 p 6

[Text] For thousands of industrial furnace facilities in which workpieces are heat-treated and tempered, refractory concrete is indispensable as an interior lining. Moreover this insulating material must withstand great stresses, such as temperatures of up to 1,700 degrees Celsius, strong mechanical forces, and also corrosive slag and gases. Naturally it should offer protection against heat losses and have a long service life. In the search for refractory concretes with better and better energy-saving benefits, for years now specialists from the GDR have helped set the tone internationally. Leading figures in this connection are scientists at the Leipzig Institute for Energetics and experienced workers at the Brandis Silicate Works, which is one of the most important producers of such products in this republic.

One of the latest developments by the two partners is a refractory concrete with man-made pores. This special material has, for example, small holes in a definite pattern, and this produces an important effect.

The material to be heated is warmed more economically and better in terms of energy used. So far, specialists have outfitted about 200 furnace facilities in foundries, steel works, and machinery-building enterprises with this patented innovation. "Energy savings of between 20 and 30 percent have been demonstrated in these places since then, and by this time it is not only users in the GDR who have been convinced about the quality of our product," reported Hans Hoer, head of research and development at the Brandis plant. Some foreign firms as well have already made inquiries about the advantages of the new process. At present, purchasers from Hungary and Bulgaria are redesigning their furnace facilities accordingly. The producers from Brandis have found an economic utility of 5,000 marks per ton of artificially-porous refractory concrete employed.

But the silicate workers had to solve a problem. At first the new material was not suited, for structural-engineering reasons, to the very strong thermal stresses on the roofs of the furnaces--which hitherto had been traditionally constructed in a vaulted design. But they knew that it is precisely here that the use of this energy-saving concrete makes sense.

But here also the researchers and designing engineers of the Institute for Energetics and the Brandis enterprise found a way. Now for the first time horizontal furnace roofs made up of separate suspended elements are being put together in accordance with the building-block technique. This solution, which is also new internationally, permits a savings in refractory material of almost a half compared to the customary vaulted roofs. Moreover when there is wear, separate parts of the structure can be replaced more easily. For the users this results in considerably shorter repair and down times for the furnaces. In addition a further energy savings is achieved, since because of the smaller radiating surface even smaller heat losses occur. The experts estimated the utility of their innovation as being about 20 times larger than its cost. The precalculated economic advantages were also confirmed following completion of an 8-month testing at the Riesa Steel and Rolling Mill.

Domestic and foreign rationalization experts have filed several patents on this solution. Recently the silicate workers incorporated in their production program three different types of elements for furnace roofs.

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GERMAN DEMOCRATIC REPUBLIC

BRIEFS

HIGHLIGHTS OF LEIPZIG SPRING FAIR--The member countries of the CEMA are going to exhibit a large number of technologies and products at the 1985 Leipzig Spring Fair that are the result of successful bilateral and multilateral specialization and cooperation. The USSR will also document the benefits of close cooperation with the economies of the other CEMA countries in its collective exhibit in Leipzig. Among the outstanding exhibits there are large-scale projects that permit the joint exploration of raw material deposits, processing of raw materials and production of energy. The State Committee for Foreign Economic Relations is showing models of joint investment projects of the CEMA countries, such as the oil pipeline "Friendship" and the Mining and Processing Combine Erdenet in the People's Republic of Mongolia. With more than 50 welding technology exhibits, the "Welding Technology of the USSR" section is one of the exposition's key areas. Reference is made to the close scientific-technical cooperation between the Soviet Paton Institute and the Central Institute for Welding Technology in Halle. One of the interesting exhibits in this sector is the semi-automatic "Intermigmat" system that was jointly developed by specialists of the USSR, the GDR and the People's Republic of Bulgaria. Two new computers, the EC-1036 and EC-1061, are shown at the Spring Fair by the Electronorgtechnika export organization. They are a valuable addition to CEMA's standardized computer system. The results of the successful multilateral collaboration of groups of scientists and specialists from research institutes and from industry in countries participating in the ESER system [Uniform Electronic Data Processing System] are presented in an impressive exhibit in the "From Building Blocks to Computing Centers for the Domestic Economy" section. The successful USSR-GDR cooperation in energy matters is demonstrated in the Soviet pavilion through their joint efforts in constructing the heat power plant at Jaenschwalde and the nuclear power plants at Stendal and Nord. [Excerpts] [East Berlin NEUES DEUTSCHLAND in German 20 Feb 85 p 1-2] 7994

TRAINING COURSE ON ATOMIC ENERGY--A training course organized by the GDR's State Office for Atomic Security and Radiation Protection has begun at Rossendorf near Dresden for 26 future inspectors of the International Atomic Energy Agency (IAEA). This course, the fifth to be held in the GDR, is part of a program to train scientists and technicians as international inspectors who control, on behalf of the IAEA, signatory nation adherence nations to the obligations they assumed by signing the Nonproliferation of Nuclear Arms Treaty. Through lectures, demonstrations and laboratory exercises, the trainees

are familiarized with the GDR's nuclear material control system and the surveillance methods applied by the State Office for Atomic Security and Radiation Safety, the nuclear power plant at Rheinsberg and the Central Institute for Nuclear Research of the Academy of Sciences. With this training course, the GDR is making an important contribution to strengthening the regime of nonproliferation of nuclear weapons, a high-priority item of the socialist countries for their participation in the work of the IAEA. [Text] [East Berlin NEUES DEUTSCHLAND in German 20 Feb 85 p 2] 7994

INCREASED STEEL PRODUCTION REPORTED--Some 35 years ago today, on 15 February 1950, the cornerstone was laid for the new steel mill in Brandenburg. The legendary furnace I continues to be in operation today. By October 1967, 11 more Siemens-Martin furnaces had been added. Today, cranes guided from control consoles, pour the necessary raw material into the automatically opening and closing furnace crucible. After tapping, the giant pans filled with molten metal are being pulled out of the hall by remote-control switching engines. In Furnace IV, the "Youth Furnace", a heat guidance system supported by microprocessors is being tested. The only hard physical work that is now being done is during tapping. After two comprehensive reconstructions, the Brandenburg furnaces are high-powered aggregates which match any international competition. The plant, originally designed for 500,000 tons, today produces 2.5 million tons of steel a year. Its production ranges from fine steel, semi-finished products, sheet metal, wire and consumer goods. It is our republic's largest producer of raw steel that is manufactured not only in Siemens-Martin furnaces, but also in the two furnaces of the electro-steel plant put into operation in 1979. The workers of Brandenburg supply the economy to an increasing extent with higher-grade rolling steel which provides consumers with considerable savings in material. For example, the use of better-quality steel in the building industry permits material savings of up to 20 percent. By producing new types of construction steel and concrete steel and by expanding the availability of cold-formed steel, the Brandenburgers have achieved larger economies in the use of materials and a better mass-output ratio of products made from their steels. Among the 9,200 workers employed at the main plant of the high quality steel combine, there are 861 apprentices who are being trained at the main plant of the fine-steel combine as, for instance, metallurgists, maintenance personnel and also plant railroad workers. [Excerpt] [East Berlin BERLINER ZEITUNG in German 15 Feb 85 p 3] 7994

COMPUTER GRAPHICS LAB PLANNED--A basic laboratory for image processing and computer graphics is to become operative soon in East Berlin. It is part of the Academy's Central Institute for Cybernetics and Information Processing which has several years of experience in this area. Through international division of labor with other socialist countries, basic research will be further advanced. The lab will solve basic problems in its area and contribute to a new generation of computer systems. One of the focal points is the development of a basis for hardware technology for highly integrated circuits. In digital image processing, the objective is to build a system based on top-performance special processors. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 26 No 10, 15 Mar 85 p 1] 7994

NEW PLANT FOR BIOTECHNOLOGY--The VEB Pharma Neubrandenburg, which is part of the GERMED combine, is still under construction. Nevertheless, the enterprise has already started to produce an electrolyte concentrate solution. In 1986, it plans to manufacture penicillin based on biotechnological principles as well. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 26 No 10, 15 Mar 85 p 4] 7994

INVENTORS' SCHOOL LAUNCHED--The GDR press called a "specialist camp of future young innovators and rationalizers" the first inventors' school of the GDR. Technically gifted girls and boys from schools of the Gotha district were selected. The camp in Ohrdruf took place during this year's winter vacations. Most important part of the work is the solution of tasks of the plans in science and technology of such enterprises where the young people serve their polytechnical instruction. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 26 No 10, 15 Mar 85 p 5] 7994

GDR-USSR ENGINEERING COOPERATION--An anthology of the Technical University Leipzig provides information about the research cooperation with the Moscow civil engineering institute "Valerian W. Kuibyshev". The technical university is also harmonizing outlines of plans with other Soviet partners for cooperation during 1986 through 1990. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 26 No 8, 28 Feb 85 p 7] 7994

METAL ROLLING PROCEDURE IMPROVED--In the machine tool factory Bad Dueben mirror-smooth surfaces will be obtained during the process of rolling round steel. This will be guaranteed by a new method and a corresponding special rolling machine. Smoothing of the raw material between two rotating cylindrical tools will occur within tolerances of one-thousandth millimeter. The reinforced surface will guarantee a longer life of the work place. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 26 No 9, 8 Mar 85 p 8] 7994

NEW MEASURING DEVICE DEVELOPED--Varied light reflections can be obtained with an automatic light which is produced in the "Erich Weinert" measuring instrument factory, Magdeburg. An electronic programmed timing control is built-in which can, for instance, produce continuous darkening. A special design of the "Varolux automatic" will have a dimming switch. According to plan, 25,000 pieces will be produced in 1985. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 26 No 6, 13 Feb 85 p 4] 7994

MULTI-AXIS ROBOT DEVELOPED--An arc welding robot "Baukema 1" was developed at the Central Institute for Welding Technology (ZIS) in Halle. It is used for efficient MAG-welding of a variety of different components. Positioning and movement of the parts to be welded is done with controllable turning tables DT 360. The welding robot consists of building blocks of the system ZIS 995 with robot control ZIS 10 36 and the microcomputer K 1003. By using an adaptive control, this robot moves eight axes. Use of the recently developed welding equipment for arc welding of the VEB Finsterwalde and the new robot burner RB S ZIS 12 54 are intended to provide high reliability. In order to unburden

the operator, a newly developed burner cleaning device ZIS 12 67 was installed in the area of motion of the robot. It takes over the spraying of the gas jet chamber, in addition to the cleaning function. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 25 No 47, 6 Dec 84 p 4] 7994

PRODUCTION AUTOMATION IMPROVED--The Bitterfeld pipe works intend to produce by year's end half a million sintered carbide drills for stone and concrete, at first with diameters from 8 to 1 mm. This will be done in a new plant, which is highly automated. Development was supported by the tool combine Schmalkaden. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 25 No 47, 6 Dec 85 p 4] 7994

FLEXIBLE MANUFACTURING SYSTEM FOR USSR--The GDR concluded contracts with the USSR concerning the import of 1.2 million tons of rolled steel and steel tubing. Accordingly, the Soviet Union will deliver to the GDR, during the second half of 1985, primarily boiler-plate and shipbuilding-plate as well as rails and rolled wire. These agreements were reached between the Soviet Foreign Trade Association Promsyrioimport Moscow and the Foreign and Domestic Trade Enterprise for Metallurgical Commerce of the GDR. These agreements are very important for supplying metallurgical products to such sectors of the GDR economy as machine construction, shipbuilding, and building construction. The GDR has been procuring such imports from the USSR for decades. From the GDR, the Soviet Union procures another flexible production system for the processing of prismatic workpieces. The complete system is valued at 23 million rubles. The contract concerning the export of this system was agreed upon at the Leipzig Fair, between the Foreign Trade Enterprise Machine Tools and Tools Export-Import and the Soviet Enterprise Stankoimport, in the presence of the Minister for Tool and Processing Machine Construction, Dr. Rudi Georgi. The prime contractor for the production system will be the VEB Rawema Karl-Marx-Stadt. The system comprises 19 processing centers "CW 1000" from the parent enterprise of the Fritz-Heckert Combine. These are connected with a central shelf storage system by means of rail-bound transport robots. Furthermore, the GDR and the Soviet Union agreed on further mutual deliveries of cutting and non-cutting machine tools as well as machines for special technological tasks. The total value of these contracts runs to 250 million rubles. The Soviet Government delegation visited the Leipzig Spring Fair under the leadership of the Minister for the Electrical Engineering Industry in the USSR, Anatoli Majorez. In the meantime, the delegation has gone home. [Text] [Dresden SAECHSISCHE ZEITUNG in German 14 Mar 85 p 5] 8348

STEEL MILLS SHIFT WORKERS--The Pipe Combine Steel and Rolling Mill Riesa has supported production start-up in the converter steel plant of the Strip Steel Combine Eisenhuettenstadt by the deployment of 140 experienced professionals and engineers. From the very beginning, the metallurgists, furnace workers, repairmen, and shift supervisors used their know-how to render significant services at the new metallurgical plant. Already months before the beginning of production in November of 1984, the Riesa Combine delegated the experienced professionals to Eisenhuettenstadt. "Naturally they left behind gaps," explained Dr Erich Ansorge, general director of the Pipe Combine Riesa. The

point was to close these gaps quickly by specific efficiency measures as well as by prompt socialist aid from other areas of the enterprise. The personnel who were provided for deployment in the metallurgical combine were given the opportunity of familiarizing themselves with their future work place as well as with the social conditions at their new residence. They could look around in Eisenhuettenstadt for 2 days and could inform themselves. Familiar questions, such as the employment of the spouse or the accommodation of children were elucidated and clarified. According to statements by the general director, Dr Ansorge, the start-up of the converter steel plant in Eisenhuettenstadt initiated a comprehensive efficiency move for steel production in the GDR. The beginning of production at this plant is also supposed to have consequences for the Pipe Combine Riesa. First of all, in the Siemens-Martin Plant I of the Steel and Rolling Mill Riesa, three Siemens-Martin furnaces will be eliminated step by step. The concomitant restructuring made it necessary to employ the available personnel as efficiently as possible within the combine, having regard for social perspectives. "None of them will become jobless," explained Dr Ansorge. This restructuring process has been the most complicated one to date in the combine. Just in the Siemens-Martin Plant I and in the Rod Rolling Mill it involves 425 employees. Of these, 120 will be employed in other areas of the metallurgical enterprise. All the others will continue to work in their previous area, but under greatly altered conditions. A conception was worked out for the rational use of the social work capacities in the Pipe Combine Riesa until the year 1990. On the basis of this conception, a job-availability catalog was produced there. It offers a survey over activity areas that are immediately available. Also to be found therein are jobs in newly to be constructed production sites, for example in consumer goods production.

[Text] [Dresden SAECHSISCHE ZEITUNG in German 27 Mar 85 p 3] 8348

SENSOR TECHNOLOGY RESEARCH DESCRIBED--The Magdeburg Study: Sensors greatly expand the capability of robots. The scientists of the VEB Research, Development, and Rationalization of the Heavy Machinery and Plant Construction (FER) wish to speed up the introduction of automated production sections in their industrial branch. In a study they have investigated the opportunities that are offered in this connection by modern sensor technology. The objective of using sensors to equip industrial robots with "intelligence," so that they can recognize symbols, contours, and material conditions and can react thereto. The study clearly shows what special requirements are imposed on the technical "sense organs" of the robots. For this purpose, the researcher analyzed the international status in this area, especially in connection with metal-cutting shaping. Studies in the robot centers of the GDR, results of basic research in the Academy of Sciences and other institutions, patent researches and know-how which was gathered in their own laboratories all contributed to the result. Powerful sensors, in the view of the experts, are an essential presupposition for automating in particular small- and medium-series production. Studies have shown that, in many places, machine tools have in the meantime been operated by robots. However, when converting machines to new series, the expenditure often is very high. Conventional robots up to now are only rarely capable of gripping a ready part that does not have millimeter precision, of organizing transport, or of taking part that does not have millimeter precision, of organizing transport, or of

taking over quality control. But it is precisely in such processes that the Magdeburg researchers still see numerous application opportunities for technical "sense organs." Dipl.-Eng. Ulrich Bierhals, manager of the topic on sensor studies in the FER, cites as an example sensors which facilitate higher precision of gripping arms during handling. They are capable of recognizing workpieces according to their size and position. Their effect is that the parts are grasped reliably. Furthermore, the FER is carrying out studies on sensors which are coupled with a machine tool. Among other things, they have the task of determining the degree of wear of the tool and of securing high quality in production. Comparable to an artificial eye, the optoelectronic system recognizes, at a distance of half a meter, whether the cutting edge is worn. Up to now, an operator had to check this condition, and, for this check, the tool had to be dismantled. The documentation comprises more than 200 pages. It should aid users to recognize their problems in connection with the deployment of industrial robots, and to find more quickly solutions in the sense of a high degree of automation. The sensors make it possible to transfer to the robots more extended duties. A survey shows everything that is here achievable and meaningful, but also where the developmental status of sensor technology still has its limits. The international trend, according to the scientists, aims towards sensor systems which can easily be modified for special applications. The GDR, too, is carrying out research in this direction [Text]
[East Berlin BERLINER ZEITUNG in German 12-13 Jan 85 p 13] 8348

ROBOT PRODUCTION GOALS CITED--In 1985, another 13,500 units will be added to the 43,000 industrial robots already in use in our economy. These include the improved ZIM 10-1, which bears the quality mark "Q" and which is being built in relatively large unit numbers above all as a technological unit for arc welding. It comes from the Berlin Automation Enterprise of the Central Industrial Facility Construction Combine for Metallurgy (ZIM). At that facility a research unit for industrial robots is in operation which is being managed jointly with the GDR Academy of Sciences. A team of experienced specialists are making use of the most modern equipment for the further development of electrically powered articulated robots, especially in the field of sensor technology and visual recognition systems. The combine has been producing this highly productive equipment since 1980 on an assembly-line basis. So far, 480 flexible and several hundred specific-use industrial robots have been manufactured in all. [Text] [East Berlin NEUES DEUTSCHLAND in German 5-6 Jan 85 p 3] 12114

CENTER PRODUCES CNC CONTROLLERS--Erfurt Electronics VEB has established a low-volume production center for microelectronic controllers. In the future, controllers for newly developed plastics-handling machinery from the Material-forming Combine are to be designed and manufactured there. These control units are also going to be adaptable to special customer requests. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 25 No 47, 6 Dec 84 p 6] 12114

NEW CNC MACHINE TOOL--Since last August the Aschersleben Machine-tool Factory has been producing a new type of machine. The machine in question is a CNC-controlled machining center by means of which several cutting processes can take place simultaneously, such as milling, planing, and drilling. Thus it is said to be possible to machine five sides of a workpiece on this tool in one chuck setting. In connection with the preparation of intricate and very large workpieces for heavy machine-building such as casings for ship diesel motors, within the same period of time a higher production output is achieved in a greater precision. This equipment operates in a completely unaided fashion. It is said that only a single worker is needed for monitoring purposes. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 25 No 42-43, 7 Nov 84 p 4] 12114

INFRARED ETCHING METHOD IMPROVED--At the Muehlhausen/Thuer. Microelectronics VEB, a working area for the infrared etching of diode chips has been set up. This innovation is based on non-contact technology. Some 25 chips are etched on a substrate slice in 20 seconds. The infrared lamp is moved past the substrate slice in stepwise fashion. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 25 No 42-43, 7 Nov 84 p 5] 12114

STEEL MILL REPAIRS REPORTED--Towards the end of October/beginning of November, at the Brandenburg Steel and Rolling Mill an approximately 10-day repair program for the plate rolling train took place. During this major overhauling, more than 400 maintenance personnel, electricians, and mill workers performed work on, among other things, the slab pusher furnaces and on the roll-pass roller tables at the roll stand. Moreover, the replacing of working parts on the pinion and the repairing of the shears was provided for, with the installation at the same time of volume measuring equipment. A greater labor productivity is being sought by lengthening the cooling rack. The objective of this major repair work was a "high degree of availability" and a "constantly high production" by the facility. This thick-plate facility, which was constructed in 1949, furnishes plates from 6 to 16 millimeters in thickness. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 25 No 48, 13 Dec 84 p 4] 12114

GLASS PRODUCTION AUTOMATED--At the Jena Glass Works VEB, currently a procedure new to the GDR for dividing block glass into cut-glass plates is being "successfully" tested. For decades, this operation had to be done using a large amount of manual labor. With this innovation, except for the feed-in and removal all process steps take place automatically. The number of separate manual operations is reduced from an average of 45 to 3. Moreover a conversion from 2-machine to 3-machine operator attendance is to be implemented. Experts at Zeiss expect an increase in labor productivity of at least 65 percent. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 25 No 48, 13 Dec 84 p 4] 12114

DIESEL LOCOMOTIVE RECONSTRUCTION PLANNED--A focus of the developmental work at the Gotha Gearing Works VEB has been the beginning of production of a new axial gearing for diesel locomotives. This component is intended for the reconstruction of GDR diesel locomotives. Together with a new motor, this innovation leads to an increase in performance of the locomotive from a previous 1,200-1,300 kW to 2,400 kW. An important new development in

this connection is the use of spheroidal graphite cast iron instead of cast steel. By this means the aim is to increase by 50 percent the amount of travel performed by the locomotives between general overhauls. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 25 No 45-46, 29 Nov 84 p 8] 12114

NEW FLUORESCENT MICROSCOPE DESCRIBED--"Jenalumar" is the name of a new fluorescent microscope from the Jena Zeiss Combine. It is intended to be of use in both research and also quality control (for example in semiconductor technology). In addition to increasing productivity, it is also said to enlarge the informational content to over 170 percent in fluorescence microscopy of large fields. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 25 No 45-46, 29 Nov 84 p 8] 12114

UNIVERSAL CHUCKING DEVICE--Hitherto, the keyways in shafts on conventional milling machines have been individually milled. Now at the Hennigsdorf Locomotive Construction and Electrotechnical Plant VEB a universal chucking device has been developed and constructed for milling keyways in shafts of different diameters and with various keyway dimensions on the NC [numerically controlled] saddle-table milling machine FKrSRS 250-B. With this universal chucking device, it is said to be now possible to machine simultaneously, in a multiple gripping, six different shafts with differing keyway diameters. [Text] [Bonn IWE WIRTSCHAFTSDIENST in German Vol 25 No 33-34, 12 Sep 84 p 13] 12114

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HUNGARY

PROGRESS IN MICROELECTRONICS PRODUCTION, TRADE ASSESSED

Budapest NEPSZABADSAG in Hungarian 10 Apr 85 p 5

[Article by Mihaly Sandory, director general of the Microelectronics Enterprise: "Domestic 'Micro Successes': Towards Selective Catching Up"]

[Excerpt] Improving Economy

It is worth noting that both within and outside the profession there were, and to a certain extent still are, passionate debates about the economy of domestic microelectronic parts manufacture. I must say that so far we have been fortunate, because the changes which have taken place in the world economy in recent years carried water to the mill for a successful realization of the program. At the beginning of the development the world market parts prices decreased, then at the end of 1983 and beginning of 1984--when we could begin manufacture and sales--they began to rise relatively quickly. Thus, at present, the prices of the integrated circuits of the Microelectronics Enterprise are even lower here and there than the import prices, duty included. But in my opinion this situation can be regarded as only temporary and is primarily a consequence of a momentary shortage on the capitalist markets.

At present our prices are also more favorable than the offering of socialist parts. Our competitiveness in this area can increase in a lasting way--in possession of technology which has been realized and with new information.

I feel that when we selected our product scale we recognized in time that we must lay the foundations for the economicalness of the investment not with the development and manufacture of mass produced parts but rather with a swift development and broad application of small series circuits, the so-called equipment-oriented circuits. To explain the advantages let me cite a simile borrowed from the clothing industry. The mass produced circuits correspond to "ready-made clothes", but the equipment-oriented circuits correspond to "tailor-made clothes." That is, we are developing and manufacturing circuits which meet specific needs, the use goals. It is a world tendency that one can progress more quickly and achieve greater results with this developmental trend. Such circuits can be sold well in themselves, but in addition they can greatly improve the market chances of our domestic instrument industry -- including medical instrument industry--automation industry, computer technology and communications engineering industry.

The time just past, a brief time it is true, proves that our decision was correct. The development and manufacture of small series circuits really can be cultivated with the planned economicalness. Our circuit designing engineers doing highly qualified intellectual work justly demand not only that they be equal to their foreign colleagues in regard to the technical environment determining their working conditions but also that their interest or incentive should express the novelty and value of their activity. They may justly feel a lack in this area so far, and in part this explains why we are struggling with a shortage of experts in some areas. But in the wake of the regulator changes of this year I hope that these tensions may be resolved quickly and that we will be able to pay our highly trained engineering staff in proportion to their performance.

Resistance to the New

Our experiences are less reassuring in regard to the use of modern parts. In addition to providing broad information, our enterprise organized expert training within the framework of the Engineering Institute for Continuing Education as a precondition for the use of complex circuits. The first study courses ended with good results. However, the use of these modern parts should--and could--be spreading in our domestic industry at a faster pace. Alongside the good achievements--the initiatives of the Communications Engineering Cooperative merit special attention--we could give a long list of missed opportunities. I see the fundamental cause of this in the distortions of the interest system, going beyond an aversion to the new. To put it briefly, the present functional mechanism of the CEMA market--primarily the quota system--not only does not force the new, the more economical and the more efficient, in some cases it can happen that it hinders innovation, makes it very risky to try something new.

Closely linked to the economy of development is the fact that we have not succeeded in making progress in narrowing and optimizing the assortment of parts used in industry. There are possibilities in this area in principle, but at present the necessary--and planned--material assets are not available. It must also be mentioned here that the development of the traditional, that is non-microelectronic, parts manufacture of the electronics industry has lagged considerably behind the goals designated in the central program. Even with the most optimistic approach the present situation here can be called only stagnating, and to a large extent it is holding back a wider spread of the microelectronics culture.

So this is where we are in the realization of the program. I consider our present--short term--task to be an increase in economy and a continued improvement in the use of the modern technology that we have adopted. In addition, we must begin developing standards and preparing ourselves for further progress.

The fact is that in this branch of industry--developing with stormy speed--one cannot simply "stay at level", and one should not. We must lay the foundations now for the research and development tasks of the new developmental phase due in the second half of the Seventh 5-Year Plan. Only in this way will it be possible that our present, central efforts aimed at reducing the technological

gap between ourselves and the developed countries can lead not only to fleeting success but rather to long-term economic achievements which can be measured at the national economic level.

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POLAND

NEW ENGINEERING PRODUCTS ADVERTISED

Warsaw POLISH ENGINEERING in English No 5-6, May-Jun 85 pp 30-31

[Text] Equipment for Impact Testing of Materials

The equipment for impact testing of materials serves for testing the resistance of materials to cracking at shock loads (version A) and testing of plastic properties of metals deformed with high deformation speeds as well as for impact testing of rocks (version B). The construction of the equipment is based on the principle of modified Hopkinson's rod. The WPH-10 apparatus consists of a launcher, control console, Hopkinson's rods with suspension and a brake.

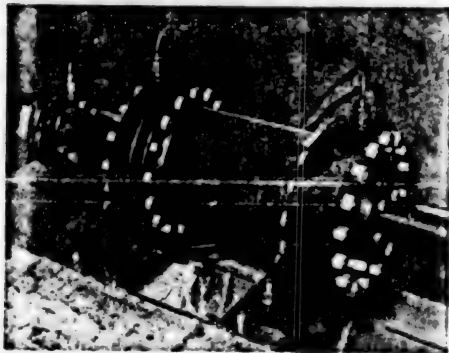
At the moment of measurement the air compressed in the launcher impetuously gets into the barrel causing the firing of the cartridge-rod. It strikes the transmitting Hopkinson's rod generating therein a longitudinal rectangular wave. The longitudinal compression wave reaches the other rod face, becoming partly reflected as a stretching. The other part of the wave passes through the

The entire system of rods is broken by the brake.

For the measurement of longitudinal wave shape electro-resistant strain gauges are used in rods.

The WPH-10 equipment is designed for work in laboratory conditions. It ensures the attainment of very short sample loading times ($\sim 20 \mu s$) and a load speed by to $10^6 \text{ MPa} \cdot \text{Vmm} \cdot \text{s}^{-1}$.

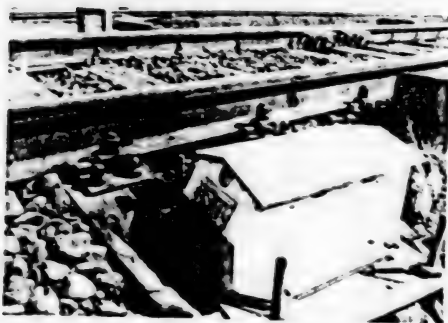
Maximum working pressure of the system amounts to 16.2 MPa while the impact speed ranges from 1 to 25 ms^{-1} . The diameter of Hopkinson's rods amounts to $\phi 20 \text{ mm}$, transmission rod length 1000 mm and receiving rod length 1100 mm.



sample and is transmitted by the receiving rod.

Scientists for the Railways

ASTA is the name of an automatic thermo-alarming system developed by the Marine and Industrial Electronics Institute of the Gdansk Technical Institute. It serves for detecting heated bearings of railway wheel sets. ASTA carries out a contactless temperature measurement of axle-boxes of wheel sets using, in this connection the infrared radiation emitted by the axle-boxes. Data are automatically transmitted to a printer.



The prototype of the above equipment is just being tested under operational conditions on Polish railways.

Pipe Layer

In the HUTA STALOWA WOLA Industrial Combine the series production of SB-85 pipe layer will soon begin.

The SB-85 is a machine widely used for transport and lifting work at the construction of power pipelines under difficult climatic and terrain conditions.

The maximum lifting capacity of the machine depends on its radius and ranges from 1000 kN (at minimum radius of 1.22 m) to 140 kN (at max. radius of 7.32 m). Hydraulic control and drive of the jib, hook and counterweights ensure easy work motions. Optimum load handling speeds are secured by the wide range of stepless hook lifting and lowering speeds. The jib is additionally provided with a limiter, securing it in the maximum upper angular position, and an angular lifting indicator.

The pipe layer is equipped with an engine developing 231 kW, a single-stage torque converter and power-shift gearbox. Its independent two-speed planetary gear with hydraulic control of each crawler track ensures easy manoeuvring of the tractor and gentle turning with full transmission of force on both crawlers as well as on-the-spot turning. A single-pedal serves for braking the tractor at downhill run. It acts with hydraulic assistance on the brakes of both crawlers. Considerable spacing of crawler frames and their considerable length ensure great stability making possible for the tractor to negotiate ground slopes. At the same time the large area of crawler treads contact with the ground results in low ground pressures of the machine.

There is also the possibility of equipping the tractor with especially widened crawler treads so as to further reduce the ground pressure.



Detects and Extinguishes Sparks



In the Chipboard Factory at Karlin a unique equipment has been developed which detects and automatically extinguishes sparks. The equipment prevents the dangerous for production spontaneous fires in pipelines for the pneumatic or mechanical transport of wooden chips or other inflammable materials.

Detection is made possible by a suitable arranged set of photooptical sensors controlling the tested pipeline. The set is connected with a centre actuating the electrovalve. When the first sparks appear the valve turns on the inflow of water from the hydrophore-pump system into the pipeline.

The detector acts independently of current supplies as it has its own supply. Equipment of the above type find application also in grain silos, furniture factories, etc.

They Record and Measure



In the Experimental Plant of the Institute of Plasma Physics and Laser Microfusion in Warsaw the production of semiconductor and thermal detectors takes place. They serve for the recording and measuring of infrared radiation. The principle of operation consists in converting the energy of detected radiation into an electric signal convenient for measurement. Instruments of the above type are used in numerous technical equipment i.e. in remote temperature measuring apparatuses in, for instance, mines or in thermographs serving for the thermal space illustration. With the use of an uncooled photon detector of 8 to 14 μm range the detection of CO_2 laser radiation takes place. It also finds application in equipment utilizing the above laser type, such as: range-finders, lidars and machine tools. An important quality of the detector is high operation speed exhibited by the possibility of recording very short pulses of a risetime of the range of a milliardth part of a second. The above detectors are already exported to the United States, Japan, Great Britain, Italy and the Federal Republic of Germany.

Lasers in mining



In the Chief Mining Institute in Katowice two interesting laser devices have been recently developed.

A laser plumbing device designed for plumbing and check-ups in high buildings like shaft towers and chimneys. The measurement consists in matching the laser ray beam running down with a beam reflected from a horizontal mercury mirror.

The simple to service device consists of a laser transmitter and a floating liquid mirror.

A novel device is also the laser methane-meter for continuous measurements of methane concentrations in mining headings. Measurements take place selectively and are based on the phenomenon of narrow-band absorption of a helium-neon emission line. Precise information on the methane content in air, taking the shape of an electric signal, can be send by a normal cable way to the mine's control room, to the ventilation or demethanation station.

Ultrasonic Thickness Gauge

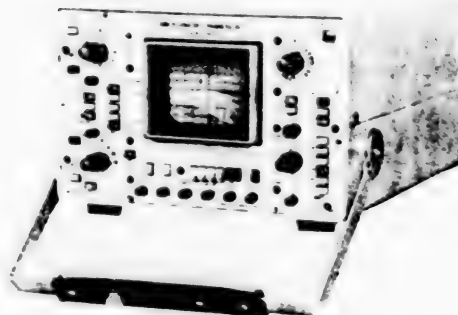


The UNIPAN Scientific Instruments Plant has for the first time presented at

this year Spring Fairs in Leipzig the ultrasonic thickness gauge type 545 LC. It serves for thickness measurements of steel elements accessible from one side only. It makes possible to detect internal flaws of materials such as, for example, delaminations as well as the corrosion degree of internal pipe walls, tanks, etc. This is of particular importance in the case of corrosion examinations of chemical industry systems, pipelines, tanks, ship platings, heating systems, etc. without the need of disengaging the examined plant or equipment from operation. Such applications bring considerable savings. The instrument is simple to use and can be serviced by unskilled staff. Its additional qualities are small dimensions and low weight, dust and humidity proofness, making possible the use of the instrument under heavy field conditions.

The 545 LC ultrasonic thickness gauge won at the International Leipzig Fair a gold medal.

Memory oscilloscope



The type KR-7401 oscilloscope is a two-channel, cartridgeless general purpose electronic instrument provided with a memory. It is intended for testing, measurement, monitoring and recording of repeatable and non-repeatable, as well as single processes in the 0—10 MHz frequency band.

Operation with memory makes it possible for the afterglow time to be recorded with adjustment in the range of 0.2 to 30 sec, read out up to a dozen or so minutes, and stored in memory for 24 hours.

The oscilloscope may be used in scientific and research laboratories, industrial inspection and measuring stations. Its small dimensions and weight allow of its use in the field, near to the examined object.

The unit is provided with two vertical deflection. The transmission band is -3 dB up to 10 MHz. The vertical deflection coefficients from 2 mV/div. to 5 V/div. The oscilloscope is provided with a delaying line. The adjustable afterglow time is from 0.2 to 30 sec. Automatic cancelling within the range of 5 sec/div. to 0.1 sec/div. The readout time in excess of 4 minutes.

ROMANIA

PROGRESS IN AUTOMATION, ROBOTICS DESCRIBED

Bucharest FLACARA in Romanian 25 Jan 85 p 26

[Interview with Ion Geambasu, director of the Industrial Central for Equipment, Telecommunications, and Automation, by Cornel Nistorescu: "Automation, a Possible Dimension of Technologic Humanism"; date and place not specified]

[Text] [Question] Are you afraid of automation? Have you ever thought, as everyone does, that robots will one day become our masters and put us to work? You direct a large central which coordinates this controversial automation field, and are in a position to offer a considered answer.

[Answer] Am I afraid of automation? That is really an uncommon question; I have worked in the automation field for more than 20 years, and during this time I have asked myself or have been asked very many questions: but I have never regarded automation with fear. Still, your question does make me realize that I have often been "afraid": I have been afraid that one of our large projects would not be ready on schedule. And since you ask me about robots, I can tell you that we are currently fabricating several types of industrial robots in the central's units, and that we do have an exceptionally ambitious, high priority program for designing and manufacturing industrial robots. In 1982, at the "birth" of the first robot, the RIP 6.3, scion of the fruitful collaboration between Automatica and the Institute for Scientific Research and Technical Engineering for Automation and Telecommunications IPA (Automation Design Institute), both of them being units of our central, I was afraid that we would not complete on schedule all the design, prototype fabrication, and robot testing steps.

As to the fear that "robots would become our masters and put us to work," I can say that this is impossible; this idea is completely erroneous; being based on science fiction books about the future, books which in this case have proven to be all fiction and not at all scientific. Without entering into technical details, we must remember that the entire so-called "intelligence" of robots comes from the instructions (or program) established by the robots' builder, which have been inscribed into the robots' memory.

Assuming the inconceivable case in which a robot could be programmed to "overtake a man and force him to perform a certain job," all we need to realize is that the man (or even other men), who has a living, real intelligence, will unplug the robot!

[Question] What did automation mean in the year when you joined Automatica?

[Answer] Twenty years ago, the production of automation devices, equipment, and installations was only at its beginning ; we were producing several types of automation devices (relays, controls, some transducers, and so on), and automation installations were simple ones, usually consisting only of control panels and boards, whose most complex elements were the relays and controls; a large portion of the automation installations needed for the industrial objectives being built in the country were imported. Following the Ninth Congress of the RCP, as a result of Nicolae Ceausescu's interest, the industry for means of automation underwent an unprecedented development during the 1966-1970 five-year plan. The existing enterprises--Automatica, Electro-tehnica, Electroaparataj, Electromagnetica, and IPA--were reorganized, and new enterprises--among which FEA (Enterprise for Automation Devices)--were formed to produce the first electronic automation devices and equipment.

This development continued during the post-1970 period, so that our central currently has more than 20 industrial enterprises judiciously located in cities and industrial zones which 20 years ago were producing nothing in the way of automation; some of these are Buzau, Bacau, Birlad, Pascani, Cluj-Napoca, Timisoara, Alexandria, Focsani, and Tirgu-Secuiesc.

[Question] What was the first automation project in which you participated?

[Answer] The automation installation designed for the Savinesti Chemical Combine, in 1965, followed by the installations designed for the Pitesti Petrochemical Combine and the Galati Steel Combine.

[Question] Let's say a production process has to be automated. How do you proceed? In concrete terms.

[Answer] First of all, all the steps and process sequences of an industrial process which has to be automated must be very well understood; this initial study, called process analysis, is extremely important, particularly in the case of comprehensive automation installations which also include computers. Measurement points are established for process parameters: pressures, temperatures, displacements, and so on; and the transducers which translate these physical values into electrical signals are determined for each separate case. These transducers are generally installed in the technical equipment, and the electrical signals obtained at their outputs are transmitted through special cables to a control room which contains the entire automation installation. This produces an "electrical image" of the technical process, composed of the electrical signal values which represent the process parameters. The automation equipment which measures and records these

parameters is then defined; for parameters that must be maintained at values required by the technical process, a temperature of 200 degrees in a chemical plant for instance, we will use special automation equipment which automatically regulates a parameter through commands transmitted to execution devices.

This forms what automation specialists call a "control loop," which for each parameter controlled at a specific value, uses the following automation equipment: a transducer, a measurement instrument, a recording instrument, a controller, and an execution device. All these instruments are composed primarily of electronic components: transistors, diodes, resistors, condensers; in recent years, due to the extremely rapid technical progress in electronic components, automation equipment and instruments are increasingly composed of integrated circuits, including highly complex ones such as microprocessors and semiconductor memories.

[Question] The needs of the automation industry are enormous: it demands time, energy, lives. What are our successes in this field?

[Answer] I believe that a summary of our successes in automation can be stated in these words: we presently produce in the central's enterprises the great majority of the automation devices, equipment, and installations necessary for all the industrial branches in our country, while increasing our exportation production. There is practically no industrial enterprise or site built in Romania during the past 20 years, which does not contain operating automation devices, equipment, or installations produced by our central's units. The large industrial sites for chemistry, petrochemistry, metallurgy, power generation, machine building, cement, and so on, are equipped with automation installations produced by CIETA (Industrial Central for Telecommunications and Automation Equipment).

[Question] We have the courage to send automation devices on foreign markets! I believe that this so-called boldness can come only from the quality of the equipment and the intelligence invested in it!

[Answer] Automation equipment and installations are sold on foreign markets under highly competitive price and quality conditions, which require as you have pointed out, a significant investment of intelligence; this is especially true since our competitors are very well known companies such as Siemens, Foxboro, Honeywell, and so on. We are currently orienting our efforts in two major directions: maintaining and expanding the markets we have earned in countries to which we have already exported, and penetrating new markets to expand our exportation volume.

[Question] What is the "latest" in automation on the world market?

[Answer] It is hard to pinpoint the "latest" in automation, since there are in fact several "late news," and since in recent years we have heard more and more of them. I will mention only two.

1) In continuous industrial processes (chemical processes, power plants, cement plants, and so on), automated systems built along hierarchic structures have been created in recent years using process microcomputers mounted near major equipment, interconnected at a higher hierarchic level with one or several high capacity process computers; these systems provide better technical process control, are more reliable in operation, less expensive and easier to maintain, and most importantly, make it possible to perform new functions which could not be achieved with previous systems, as well as a partial or total optimization of installation operations.

2) In batch industrial processes (such as machine building processes), so-called "flexible automatic lines" are being created, which make large scale use of robots, process computers, and digital control equipment for machine-tools. Such a line can execute automatically, practically without the intervention of a human operator, a series of complex mechanical operations (turning, drilling, milling, boring, grinding, and so on), including the transportation of parts from one machine to another, quality control during processing, and final quality control, for complicated mechanical assemblies such as tractor engine blocks; when an engine type is changed, the entire automated line is "flexibly" redesigned by reprogramming the computers, robots, and other equipment which includes process computers, in keeping with the technical specifications of the new engine type.

I can tell you that we are working intensively on designing both types of the new automation systems which I briefly described. At the same time, in order to achieve a high level of standardization in research-design as well as, and especially, in production, testing, installation, servicing, and training of operating personnel, we are presently at an advanced construction stage at IPA--in collaboration with Automatica, FEA, and the Cluj-Napoca IEIA--a standard, modular system of functional electronic boards, power supplies, board cages, and cabinets, for various industrial applications. This standardized system called Multiprom, represents one of the largest research-design projects carried out in our central's units; it is used as the basis for equipment in the Numerom family of numeric controls for machine-tools, equipment for industrial robot control, process computers, electronic equipment for ships, and so on.

[Question] Everyone talks about robots, and I find myself drawn into the conversation. Maybe they are not that important?

[Answer] Of course, in the broad sense of the word, it is man who is most important, not robots. Robots are first of all the fruit of man's creativity, and this fact is as significant as it is essential.

[Question] Are there industrial robots "born" in Romania?

[Answer] RIP 6.3, one of the first industrial robots in Romania was built by our central, the result of a collaboration between Automatica and IPA. A Polar Coordinate Industrial Robot (RIP), with a payload of 6.3 daN, it was

listed as series zero, while a robot with a ten times greater payload was adopted as prototype until 1985, when it too was listed as series zero. I might mention that in 1982, the designer collectives at Automatica and IPA were awarded the Aurel Vlaicu Prize of the Romanian Academy for the RIP 6.3.

[Question] Why don't we have cleverer, more skilled robots? Sharper, in other words!

[Answer] We must first of all build industrial robots that are sufficiently "skilled" and "sharp" to solve concrete problems raised by industry. Manufacturing processes consist of a multitude of relatively simple operations, such as the handling of semifinished parts and tools, operations which can be automated efficiently with simple robots--manipulators. The levels of "intelligence" and mobility of a robot must be determined case by case, as a function of the real needs of the installation which is to be robotized. We currently have reached the advanced phases on designs whose performances will be compatible with the most advanced units available in the world.

[Question] Do we have a generation of specialists to whom we can hand over our robots? Are the future parents of Romanian robots well trained?

[Answer] The answer to these two questions is the same and affirmative. Yes, we do have a generation of specialists to whom we can hand over our robots, and the future "parents" of the new types of robots are the today's "children," whose professional training is in most cases excellent. The guarantee resides in their achievements so far, which are not at all negligible. We must have faith in them; their maturation is certain, rapid, and creative.

[Question] If robots could ultimately be capable of thinking, what do you believe they could not stand about man?

[Answer] Robots do not think, nor will they ever be able to think, in the true sense of the word. All their "intelligence" comes from the way in which they are built and programmed by man to perform extremely difficult operations. However, so as not to leave your question unanswered, I will tell you that if against all reason, robots could eventually manage to think, the first thing they would do is criticize their creators for overexploiting them!

[Question] During the next five-year plan, to what extent will automation penetrate further into our home life, beyond its service functions?

[Answer] Although automation has not yet penetrated widely into our home life, into our daily activities, it will during the next five-year plan. I believe that we will have increasingly developed personal computers, which we will be able to connect to territorial computer centers for access to general purpose data banks; more and more household appliances will be equipped with electronic devices, including microprocessors (various types of ranges, washing machines, and so on); and advanced electronic games will be manufactured to educate children in an environment appropriate for the "information processing era" in which they will live.

[Question] To what extent does the central which you direct contribute to the earning of great distinctions? As far as I know, many of the central's enterprises, including the central itself, are not very old; yet in only a few years they have already achieved strong positions and recognition.

[Answer] Indeed, some of the central's units are younger than others, with only a few years of existence. Some of these are the Enterprise for Industrial Electronics and Automation, in Cluj-Napoca, IAEI in Focsani, and the Enterprise for Low Voltage Electric Insulators, in Tirgu-Secuiesc.

The initial enterprises, at the formation of the central, were: Automatica, FEA, Electrotehnica, Electromagnetica, Electroaparataj, as well as the Institute for Scientific Research and Technical Engineering for Automation and Telecommunications--IPA, which represents the major strength for researching and designing automation installations; these units are 20 and even 25 years old.

[Question] Concerned as you are with automation, every day from morning till evening, and sometimes late into the night, do you nevertheless tie a knot in your handkerchief every day, so as not to forget man?

[Answer] The method is obsolete because if I were to use it, I would have to tie too many knots, and one handkerchief would not be enough. The main reason for which I do not forget man, is that all that we have achieved is due to the work of man, of my colleagues in the central and all its units. I can tell you that in very many instances they are wonderful men, captivated by their work.

[Question] Have you ever made any mistakes with respect to your colleagues? Do you know that one word uttered at the central reaches an enterprise with the weight of a rock?

[Answer] I have at times made mistakes, both with my colleagues and with myself. But once they are analyzed and their effects eliminated, errors allow us to evolve; who doesn't work doesn't make mistakes. What is important however, is not to persist in one's mistake, in a wrong decision, when your workmates show you that you are trying to roll a very big rock over them.

[Question] I would like to ask you a delicate question: why did you insist that thousands of roses be planted on the walks at the Automatica enterprise?

[Answer] I will tell you: no matter how phony or old fashioned it may seem to some, Automatica and CIETA have represented my work place for 20 years. And my work place has always meant another home for me: in front of my parents' home and in front of my house I have raised roses. I have tended them, not because I want to sell them, because you know, there are things which cannot be sold. The presence of these roses, where I work, where my family lives, and where I spent my childhood and youth, has created the strong bond of a tradition. And I am sure that I have also drawn my work strength from this continuity. The tranquility and joy offered by a flower cannot be equaled, except perhaps by music.

[Question] Are you sentimental? Why? Don't you find it a handicap?

[Answer] Why do you consider sentimentality a handicap? Sentimentality is the natural reaction which creates human equilibrium, an equilibrium that is even more necessary to those who are intensively active in technology. And why can we not consider automation--the discipline, as a possible dimension of technologic humanism?!

[Question] You have spent more than 30 years in the service of industry and mankind. The magazine FLACARA offers you a minute of truth in one-half million issues.

[Answer] I think that I have already spent my minute of truth in the seconds of sincerity which I have given you. Let me hope that just as for an artist or a doctor, "my trade is man."

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